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Electric Coagulation

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IF it is agreeable I should like to discuss some of the simpler things with you this morning. In order to apply diathermy intelligently we must meet on common ground and understand the principles. We call diathermy the utilization of the heat produced within the structures of the living body. We know that any time an electric current flows through a conductor, whether it is a good or a poor one, a certain amount of heat is produced which is a part of the electric energy transformed to caloric energy. The amount of heat is in proportion to the amount of electricity that flows through the artery and the resistance offered to the current—the more resistance, the more heat.

If you take any constant current that flows in only one direction, as the galvanic current, there are always certain physiological acts excited. One is the decomposition of the living structures, and the other is excitation of all the organs that are susceptible of an electric influence, i. e., the nerves and muscles. If, in order to produce the necessary amount of heat to give a therapeutic effect we produce a constantly uninterrupted current, we should at the same time produce a physiological action to such an extent that a great deal of damage would be done with the living system. That is why we choose the high frequency currents, which are currents which change the direction two million times a second, where we get all the necessary heat produced by the resistance and none of the physiological effects, because when the current is running in one direction the time is not long enough to produce these effects.

We talk about medical diathermy. If the heat is kept within physiological limits and does not reach a degree leading to coagulation or damage of the tissues, that is called medical diathermy. If we raise the electric current to such a degree that the living tissue is killed we talk about surgical diathermy.

Why the production of this heat is valuable is easily understood if you consider the effects of heat brought to bear upon the living tissue. In the first place we get a dilatation of all the arteries. not simply the larger ones. We know that an increased influx of blood means a better nutrition of the tissues. While the arteries are dilated, the velocity of the blood stream is maintained. Where we produce heat in a body, the temperature of the human body will be increased. An increase of the temperature leads to an increase of the function of the glands, consequently although the arteries are dilated the velocity of the blood stream is maintained. We know furthermore that if for any length of time an increase of the blood stream is produced and maintained we will find an acceleration of all the forces of the body, and after a while a vitalization of all the structural cells. A large influx of arterial blood will necessitate a more rapid carrying off of this increased amount and the carrying off of the products of metabolism will also be increased.

The curative effect is easily explained if we consider the modern theory of the use of inflammation. The initial stages are to assist repair and only when Nature fails in this work does the destruction of tissue occur. Therefore diathermy is the proper thing in cases where we need an increased blood supply and stimulation.

We apply diathermy to absorb an exudate or if an organ is suffering from anemia we apply diathermy. It is important to keep within physiological limits; at first it was believed that if we extend treatment very long the curative effect would be better but that is not the case, for we can overstimulate. The principle is not to carry diathermy too far at one sitting. It is better to apply repeated small doses than to overdo. In the first place the longer the current is run the more the heat will increase. Although the blood influx may have increased there is not much heat stored away and it may mean death to the tissues. If we have to deal with an exudate—say of the knee joint—the one advantage which we always gain is almost immediate relief of pain. The relief may not be permanent but at the next sitting the patient is again relieved and so on until a curative effect is obtained and the pain subsides permanently.

In many cases of traumatic injuries of the hip or knee joint, all other measures will fail. The patient is disabled, or he may be able to use his joint but exertion leads to a recurrence of the symptoms. In all of these cases where we have used surgical measures the deformity is very slight and we will get results.

It is very important, especially in hip joints, not to overdo the dose. As in all applications of medical diathermy we never start with the highest degree of heat that the patient can endure. We sneak into the current and go on up until the patient tells us he feels a warmth. He should not feel heat. The first dose must be light. The individual resistance is nothing we can tell in advance. Test each joint as to the amount of heat or electric current that will be tolerated. The wrists and ankles are the most touchy parts. If we want to treat the elbow joint we feel the wrists; any amount of heat the patient will tolerate at the wrist he will tolerate at the larger joints. Test the ankles for the knee or hip joint for they will stand as much as the ankles will.

If there is a liquid exudate it is important to exert pressure on th-

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absorption bandage. Pressure will lead to an acceleration of the absorption and even if it does not it will prevent an additional exudation. The simplest way is to take an ordinary sponge, moisten it and wrap it around the joint, then apply a bandage beginning with the toes or fingers. Leave it on all night. This sponge will adjust itself to the conformation of the knee joint. Next day after the sponge is removed apply diathermy and repeat the same until the exudate has entirely disappeared. It is of great advantage to oil the joint as in any other piece of machinery. In arthritis deformans, inject two ounces of vaseline into the joint and apply diathermy. This accomplishes two things; the first is the mechanical lubrication of the raw surfaces; second, not only is the vaseline liquefied so that it penetrates to every nook and corner but at the same time the quantity of blood in those parts is increased. Reduction of pain and increased usefulness of the knee joint results until the vaseline is absorbed, whereupon the treatment is repeated. While the treatment is not curative the results are satisfactory. The patient is relieved and enabled to use his joint for the time being.

The heart is the most important organ in the regulation of the blood supply. Shooting pains, fainting spells and all these symptoms are due to an insufficient blood supply of the heart. The nerve centers that regulate the heart action are located between the ventricles and the auricles. If on account of the calcification of the coronary arteries the blood supply of the nerve centers located between the ventricles and the auricles becomes lower, then an attack will occur because the nerve centers are reduced in blood supply. If heat produced by a high frequency current is applied, the femoral arteries become dilated and the patient will get over the attack. This dilatation will persist for quite a while after the treatment but after a while the treatment must be repeated. While it is not a cure—we cannot change the arteries—we relieve the patient for a long time of all these dangerous symptoms. The arteries of the heart are dilated so it is important not to overdo this treatment.

We follow these rules: In the first place any time that either the abdominal or pectoral cavity is treated the diameter of the electrodes should correspond with the depth of the chest or belly. The sphere put on the chest and back should have the same diameter as the chest from the front to the back. Place the electrodes over the heart and begin slowly with the current and never raise it beyond 100 ma. One gets all the good results with no excessive amount of the current. The proof of this is that after the treatment is over the patient will say he feels fine. If it is overdone the heart is overstimulated and the patient will become restless and produce a cold perspiration.

These treatments should not be given oftener than twice a week. Test your patient in each case. If you have to deal with a nervous individual go slowly, with a robust individual you can go faster. The main thing is not to do too much. It is remarkable what can be accomplished in these cases.

In the last six months a few level-headed men have reported excellent results from the use of diathermy in the second stage of pneumonia. I have no personal experience but the men who report these cases are men who do not deceive themselves nor anybody else. Judging from all the reports it is worth our while to give diathermy a trial in such cases.

Diathermy again has a very useful field, here we talk about cures, in toxic neuritis and infection of the genital appendages of male or female. Practically all cases of neuritis are based on infection. There is some focal infection. The infection is brought into the circulation and if located in the shaft of a nerve produces inflammation with disagreeable consequences. First, there is intense suffering and then the atrophy of the muscles supplied by these nerves. The heat answers two purposes: In the first place the pain is relieved almost immediately. In toxic neuritis even large doses of morphine fail. The heat furnishes quick relief as a rule. It is very necessary to clean out the focus that produced the infection be it tonsils, feruncle or ulcerated teeth. Remove the cause first, then apply diathermy.

In cases of neuritis we can use rather large doses without doing any damage to the nerves. We increase the current until the patient claims to feel heat, not simply warmth. We use big doses in order to get quick results.

In the last few years it has been found that the results of any kind of a toxin damaging to the structures of the body could be relieved by the insertion of a foreign protein in the body. Originally it was done by injecting sterilized milk. Quick and lasting relief results but the use of milk has two drawbacks: (1) Large quantities must be used; unless 16 c.c. are used the result will not be good. A large syringe is used and all kinds of big needles. (2) On account of the amount injected the the patients suffer severe pain and the muscles may be sensitive for a week. The general reaction from the injection of milk is severe. The patient complains of chills sometimes, and some are prostated for twenty-four hours. Although the final result is good it is a great expense to the patient.

If certain constituents of the milk are taken, the same effects can be produced with small discomfort. There may be sensitiveness for half and hour and the general reaction is very mild. The best products are the casein products. If 0.5 c.c. is injected in the muscle all the results that could be expected will be obtained without discomfort or suffering or general reaction. They are repeated every third or fourth day until the cure is completed. This combination of injection of proteins and production of heat gives quicker and more permanent results than any other method of treatment. It is especially useful in chronic inflammation of the genital appendages of the female and male. Epididymitis is one of the hardest problems for patient and doctor. The suffering is intense. There is always the danger of the exudate becoming absorbed and the patient becoming sterile. Formerly the usual procedure was to operate. The suffering is relieved immediately and obliteration of the vas is prevented.

After we used diathermy we found that we could limit the epididymitis without surgical interference. If you have to deal with an epididmyitis and know there is pus present and the temperature rises you should operate. The first surgical principle is, "If pus is found, evacuate it." In the majority of cases there is nothing but an exudation that leads to intense pain, consequently we are not entitled to assume the presence of pus. In all these cases the application of diathermy will furnish immediate and permanent relief. Repeat it in four or five days and everything has disappeared. This is of great advantage.

In chronic cases of prostatitis we find diathermy furnishes better relief than anything else. If the prostate is massaged no products are obtained. If massage is continued the patient will often develop into a neurotic without experiencing any functional relief. If heat is applied regularly and systematically the infiltration of the prostate will subside and prostates the size of the normal fist will sometimes be reduced to normal size in two weeks.

Quite often the diagnosis of prostatitis is made and the surgeon finds in spite of his efforts to cure it that the patient is not improved. Do not forget that you may have to deal with an inflamed seminal vesicle. It is quite characteristic for the patient to have regular colic-like attacks. The vesicles become overdilated and after a while they try to relieve themselves by contraction, with the cholic-like result. If this finding is once established then we must prevent the recurrence of the formation of this exudation and try to get the dilated seminal vesicles back to their normal size.

There are two ways, the injection of proteids and the use of diathermy. It does not make much difference which is done, the results will be the same. It is very important to cure these cases for in the first place the patients suffer a good deal and finally they become so obsessed with suffering that they anticipate each attack—"When will I have the next attack?"—Nothing so much depresses an individual as to know that there is something wrong with the sexual organs. Aside from the psychic effect, the patients are absolutely sterile because the spermatozoa have died off in these surroundings. We find that sterility, so often produced and maintained by an old infection, can be cured in this way.

The same thing holds good of chronic inflammation of the female tubes and ovaries. We find that quite often a woman will complain about permanent backache which increases in intensity at the time of the menstrual congestion or at any time that she exerts herself. Once in a while they get regular spasms when the tubes contract in order to empty. In all such cases diathermy will furnish relief.

There are two important contra-indications to the application of diathermy. If the patient is inclined to hemorrhage, diathermy is contra-indicated because it will produce a greater hemorrhage. The superficial arteries are enlarged under the stimulation of the heat and the increased influx of blood may rupture them and you will have mucous hemmorhages. The other contra-indication is the presence of pus. In old exudates we do not know of a better means of getting them absorbed than heat; but in all cases where there is a suspicion of pus it should be applied because it may lead to a rapid melting down of the exudate and a rupture, and even to peritonitis.

It is easy to acertain if we have to deal with a pus case. In all cases of suppuration, even if small as to amount, there is a temperature, especially in the evening. In all cases where there is chronic inflammation of the appendages accompained by temperature the application of diathermy is contra-indicated. You can do no good and will do harm by its use. The same holds true in ovarian abscesses.

I should like to say a few words about the application of diathermy in other abdominal conditions. I do not know whether it is true or not, but in cases of ulcers of the stomach, especially those cases inclined to cicatrization, it is claimed that the application of heat will furnish relief. I think it must be considered that the use of diathermy where there is a suggestion of the presence of an ulcer of the stomach and gas, may produce a hemorrhage which might be fatal. I do not think that diathermy is indicated here.

A useful field for diathermy is in cases of nephrosis. If one is dealing with a disease of the vascular system of the kidney it is important to differentiate the two kinds of medical diseases of the kidney. One is a disease of the vascular system, nephritis, and the other is a disease of the tubular system—so-called nephrosis. It is important for thereapeutic reasons that the differentiation should be made, and at least in the beginning it is possible to distinguish them.

If we have to deal with a disease of the vascular system the first thing to do is to put the system at rest like any other inflamed organ, for it is poor policy to try to dance on a broken leg. It is easy to make the diagnosis from a rapid increase in blood pressure and from the presence of no more albumen than would be corollary with the blood. We dry out the patient. If we reduce the intake of the fluid we favor this diseased organ and the patient will recover. If we apply diathermic heat we will produce hemorrhage because we increase the influx of blood.

If you have to do with a nephrosis or a disease of the tubular system, diathermy is indicated. We know the glandular cells in the tubules furnish the urinary solids. The function of the kidney depends on the amount of blood and the velocity of the blood stream. If solids are retained then diathermy will force an afflux of blood and an increased intake of fluids.

We should first know what we have to do with and then act accordingly. Do not think for a minute that by overcrowding you will do more good. It is not just the organ you are treating but the patient as a whole. A rise of temperature maintained for any length of time will damage the endocrine glands. We store away so much heat which must be carried off. It goes through the blood into all the organs. Therefore, start with a low amperage and sneak in with the current. Test each patient as to the degree of current heat he can consume. If diathermy is abused the method is thereby compromised and consequently it would be foolish to maintain that it is a cure-all or that is a fool-proof affair. Fortunately we all learn to think. In former years so many of us used so much medicine we could not think, but thinking should come before medicine.

Modern Theories of Electricity in their Bearing on X Ray Therapy

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WE doctors ought so to familiarize ourselves with electricity that we should not be entirely at the mercy of the electrician. We hear a great deal about ions and electrons but no one tells us what is meant by these words. The theory of these is based on a few fundamental propositions some of which are of a speculative nature, but at the same time these theories explain satisfactorily the phenomena of electricity and electricians construct their apparatus on the basis of these theories. We can ask an electrician almost anything and he will do it for us.

The first supposition is that there is an omnipresent substance permeating everything, a substance which is

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extremely susceptible of mechanical and electromagnetic impulses. It is called universal ether.

The smallest particles of any matter are always charged with a certain force which we call electricity. We differentiate between negative and positive electricity. These electricities if occuring in similar amounts, will neutralize each other. If particles of matter are charged with the same kind of electricity they will repel each other. If two particles are charged one with positive and one with negative, they will attract each other. It is also believed in contradistinction to our former theories that the smallest particles of which matter consists are not atoms but the atoms are constituted of much smaller particles. The physicists have figured out that they are 1/1800 times smaller than the hydrogen atom. We call them electrons.

Our conception of the arrangement and function of the electron is this: Every atom consists of a nucleus which is charged with positive electricity. All around this nucleus are other electrons all charged with negative electricity. They revolve around the positive nucleus all the time as the planets rotate around the sun. It is accepted that the positive charge of the nucleus is equal to the sum of the negative electricity inherent in the revolving electrons. If an additional influx of negative electrons occurs, then the negative electricity will prevail. If some of these negative electrons are removed or if positive electrons are added then the positive electricity will prevail. When one atom that consists of so many electrons is split up into a group of electrons, then we talk about ionization which is the breaking up of the molecule into groups of atoms charged with the same electricity. They are called "ions" from the Greek word that means travel. They carry the electricity to a certain part and discharge it there.

The transportation of any amount of positive electricity from one location to the other is called an electric current. This transportation of any amount of positive electricity is done by the electrons themselves in metallic conductors. In fluids in solution and in gas, electricity is carried by the ions.

Suppose all of a sudden a mass of electrons start in a certain direction—that all of these negative electrons begin to travel in this one direction—then we talk about an electron ray. It is something like the movement when a herd of cattle mill around for a time and then all of a sudden start to stampede in one direction.

Oscillations are produced in the ether under the impulse of the electrons. If under certain conditions, they travel in a certain direction at a certain velocity they will produce ether waves according to the force that starts them. The shorter waves are the x-rays.

Now about the measuring of electricity. It can be best determined if we think of the flow of a fluid. If a vessel is filled with water it will run into another lower vessel. The quantity of water that will flow from the upper vessel to the lower within a given time will not only depend on the difference in height between the two vessels, but also on the size of the outlet. Now this back pressure is expressed by the name of voltage. Its velocity or the time it takes to perform in a given time is measured by so-called amperage. Velocity is the back pressure, and amperage the intensity of the current.

Electrons travel much faster in a vacuum than in normal atmospheric pressure. Suppose this represents an x-ray tube. We are able to incite the electrons either by a forceful current or by a certain amount of heat. That is used in the Coolidge tube. The electrons will travel in this direction. These rays never interfere with each other because all are charged with negative electricity and they repel each other. These rays within the tube are called the cathode rays.

It is one of the fundamental laws of physics that no energy can be lost. It will be transformed. Part of this locomotor energy, if the rays are stopped, is transformed into caloric energy. This part of the glass will get hot. What is left is used in producing oscillations of the ether, producing the x-rays. Part of the energy is transformed into heat and part used to start the rays we call x-rays.

The difference between the electronic rays and the x-rays is this: the first can be dispersed and concentrated by lenses, the same as light waves. They produce heat and light.

The x-rays cannot be deflected to any appreciable extent. They cannot be seen. They do not produce heat. They produce light under certain conditions. If they meet certain matters these matters begin to phosphoresce. The amount of x-rays produced depends on the power of absorption of the target that is hit by the electronic rays. We insert an anticathode into the tube so that a great amount of x-rays would be produced.

It was found that we always have to deal with a mixture of rays. There are rays of shorter wave lengths and of longer. It was found the shorter the wave length of the x-ray, the more penetrating it was, and the longer, the less penetrating it would be. If the x-rays are short they go through a greater thickness. The greater the velocity at which these electrodes travel, the shorter will be the x-rays that result and the more penetrating they will be; or the mixture will be more in favor of the short than the long provided we use a great velocity of the electrons. The velocity with which they start depends on the voltage employed. The higher the voltage, the faster they will travel. That is the reason we use high voltage apparatus now in order to produce the greatest amount of x-rays of the shortest wave length.

Now as to the measurement of x-rays used: In former years we used certain chemical reactions. We knew certain metal compounds would decompose by the x-rays. We judged the energy we produced out of an x-ray tube by the time it took to discolor a certain film and by the intensity of the discoloration. It does not tell us anything about the energy of the x-rays or their penetrating power. All the iontoquantimeters are based on the principle that the atmosphereic air is a poor conductor.

Take two blades of beaten gold and charge with a certain electricity. They will be separated at a certain angle and after a certain length of time they give up their electricity and again come in contact. If I ionize the air I transform it into a good conductor and the conductivity will increase with the amount of x-ray sent through; consequently the time of unloading this will be shortened.

As to the action of x-rays in the living tissue: Any time that x-rays hit an object they produce the so-called secondary rays. There are three groups. The first is identical with the original rays—rays of the same hardness. The second group depends entirely upon the atomic weight and varies according to the structure. The third are again electronic rays.

We may produce secondary soft x-rays within the body and produce a burn removed from the place where we produced our first rays from the tube. This is one of the great dangers; it is beyond our control, a thing we cannot gauge.

As to the function of the x-rays when they hit the cell: We know that the living cell is in a state of permanent change—there are constant chemical reactions going on. They are nothing but loosening of certain molecular compounds in changing

into others. New combinations are formed. X-rays accelerate this process. If it goes so far as to practically start an explosion within the cell, then the cell will die. If it is carried to a certain limit only, then the activity of the cell may be increased.

The reaction that follows an x-ray treatment within the cell is in no way characteristic for the x-ray. In other words the pathologist can not take a tumor, cut out a piece and harden it and tell whether the tumor has been rayed. X-ray is one of those powerful agents that must be used with discretion. We must not be carried off by our enthusiasm. We do not cure cancer by deceiving ourselves. The physics of the thing is too little understood and the medical profession is persuaded to accept statements with no basic foundation.

The theory is simple. The application is not so simple. The greatest physiologist and physicist cannot tell us what is going on after the x-rays enter the human body. We are able to protect the skin but we cannot control all the chemical changes that primarily or secondarily will occur in the human structure, which is plain if one understands the law of physics.

The Treatment of Malignant Tumors by the Combination of Surgical Diathermy and Radiotherapy

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I am well aware of the fact that I am treading on dangerous ground when talking about the subject of cancer therapy, especially so as some of our ideas and theories will sound rather heretical.

Let me explain how we arrived at these viewpoints which we hold. Looking, like everybody else, for anything that would help in the treatment of cancer, we combined electrocoagulation and radiotherapy with results that seem to me are better than those obtained with either method alone, or with the knife. About seven years ago a woman was sent to our cancer department with an inoperable cancer of the cervix uteri. The body of the uterus was immovable. The base of the bladder was involved. This was proved not only by the subjective symptoms of the patient but by the cystoscopic examinations. In order to be absolutely sure a little piece of the cervix was excised and microscopic examination revealed the existence of a cancer.

Without any idea of curing this patient we used surgical diathermy with the idea of stopping the hemorrhage and doing away with the fetid discharge. On account of the extensive character of the tumor we did not try to destroy the entire cancer, but coagulated to the depth of 1 c. c. and followed by the insertion of a capsule that carried 100 mg. of mesothorium. Within a few weeks everything became apparently normal. At the present time the patient is still alive and well. Examination at the present time shows a perfectly smooth vagina, not shortened. The cervix is represented by a little button and what is left of the body of the uterus is about the size of an English walnut.

We certainly did not destroy the entire tumor. One cannot belive that one application of mesothorium would cure such an extensive cancer. Some other curative factor must have come into play in order to cure this patient.

We have had the same experience in treating extensive cancers of the bladder. Before we knew much about electrocoagulation we tried it in our first case of extensive cancer of the trigonum and succeeded in destroying the entire cancer thereby. When the sloughing was finished the septum between the bladder and rectum was perforated so that there was a hole leading from the bladder into the rectum. Although the patient was relieved he died after eight months from an infectious pyelonephrosis. The postmortem revealed the fact that no cancerous tissue was left. We cured the cancer and killed the patient. The same thing happened in one other case.

In the next case of this character that came along we figured that if we should destroy the entire tumor including the involvement of the septum that we would produce the same effect. We destroyed only the superficial part, leaving the infiltration of the septum to radiotherapy, thinking that if the remains of the cancer were killed by radiotherapy that there would be a substitution of fibrous tissue for this tumor and that the septum between the bladder and rectum would be preserved. which proved to be the case. We now work in this way, not destroying the entire tumor, but only destroying the decaying part and leaving the balance of the tumor to radiotherapy.

Whether we should use a radioactive substance or x-ray is another question. The importance of diathermy was emphasized by investigating what happens when a malignant tumor is treated by electrocoagulations. Postmortems and animal experiments taught us that if a malignant tumor is coagulated there is, firstly, a partial necrosis of the tumor, then comes a zone in which the tissue is not destroyed but where the blood vessels and lymphatics are sealed. Outside of this zone there is a third one in which we find an invasion of numerous leukocytes and at the same time an energizing and reviving of all the cells in this zone.

As to the factors that may produce the cure of the cancer we may suggest this: There is absolutely no reason to believe that the accumulation of cells that represent the malignant tumor are not subject to the same biological and physiological laws as are any other cells. In the body there is always a play and counterplay between stimulation and regulation. Certain structures were made to grow at a certain stage. Why do not our teeth grow to be three feet long? Because the stimulation is counterbalanced by a regulation force. We know that if this equilibrium between stimulation and regulation is destroyed that we may get a clinical picture of acromegaly.

We think it must be recognized that the malignant tumor in its start and development is not dependent upon only one factor but on at least two factors, if not a multiplicity of factors. That there is a specific relation between the function of the cells is very well known. We know the products of certain organs will influence only cells of certain other organs. There are stimulating and regulating forces in action. The same hold good in the formation of cancer. Biologists call these regulating substances protective or defensive ferments.

How about the action of radiotherapy? It was believed, and still

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is in many places, that the curative effect of x-rays or radium was effected by direct destructive action on the cells of the malignant tumor. Just as strong an argument can be brought in favor of the general consequences as for the direct destructive action. If it were true that a curative factor is the direct action it would follow in every instance that we should make an impression on a malignant tumor by irradiation. That is not true. It is only the minority of malignant tumors that will show regressive changes under the influence of x-rays.

In cases of lymphosarcoma, provided they are amenable to x-ray treatment, it is unnecessary to ray all the tumors. It is sufficient to ray only one and the others will disappear. We had the same experience in two cases of sarcoma of the head complicated with tumors in the mamma and in the thigh. One tumor was rayed. The others disappeared. Consequently it cannot be direct action. Furthermore, we have made the following observation: If the tumor in a patient suffering from cancer is irritated or stimulated, and then the serum from this patient is injected into another patient suffering from the same general symptoms, the latter patient will improve and this improvement will hold for quite a while.

It is not farfetched to surmise that we have produced a reaction which will lead to the production of defensive ferments which when they were injected into other patients counteracted the action of the decaying cancer cells.

You will hear from every roentgenologist that the effects of radiotherapy in cancer are more pronounced and appear more quickly if the part under treatment is made hyperemic. Hyperemia means more afflux of nourishment to the cells of the cancer. It is hard to conceive why better nourished cells should more easily succumb to the action of the rays than a cell poorly nourished. Tubercular glands and superficial tubercular lesions will improve and subside under radiotherapy. The bactericidal action of the therapeutic rays is absolutely nil. In spite of that the patients improve, so there must be another factor, a general factor.

Laboratory experiments carried out have taught a few other things. If the center of a mammary cancer is excised and put in a test tube and covered with the blood taken from a calf the tissue will be absolutely digested within a few hours. Deprive the same calf of its thymus and repeat the experiment and no digestion will occur. Feed some fresh thymus to the calf for a week or so and repeat the experiment and all of the carcinolytic qualities of this blood will be present. The endocrine glands have something to do with the regulation or suppression of this cancer. At the same time the shrinking of the thymus may explain the fact that people of an advanced age are more prone to development of cancer than are younger individuals.

We had two cases at the children's hospital where cancers had developed in young children. In both these cases there was no thymus to be found. It is therefore possible to conceive the idea that under certain conditions the cancer cells will produce material which when thrown into the circulation will make the endocrine glands produce matters which will be sent to the seat of the cancer, defensive ferments which produce normal conditions, in other words, eliminate the cancer.

There is another observation proving that there are various forces at work in order to produce and maintain the cancerous growth. Men working in aniline factories show a great number of malignant tumors and cancers of the bladder. Now if this were simply due to local irritation of the tissues there is no reason why they should not develop cancers of the tongue or mouth but they develop only cancers of the bladder. There must be a special disposition of this tissue to react to certain influences.

The same holds good of those working in cobalt mines. They develop cancer of the lungs, given a certain predisposition which will lead to the formation of a malignant tumor. Clinical observation will support this theory. We found in all three cases of cancer of the bladder, after electrocoagulation and subsequent radium treatment, that the tumor disappeared entirely. The patients came back, one inside of a year and another in fourteen months with the benign papillomata of the bladder. not at the site of the former cancer but in other parts of the bladder.

If you permit the use of the expression, it seems to me that the bladder was tumorly inclined, but for some reason, perhaps through the treatment that preceded it—these impulses sent down to the tissue produced only a benign tumor. They had all the characteristics of a benign tumor—a tumor perfectly transparent with the epithelium absolutely intact. and they subsided after one fulguration. We are inclined to belive that it is possible to maintain this theory that the development of the cancer and sarcoma depends entirely upon the proportion of the defensive influence to the stimulating influence. We believe therefore, that if we use electrocoagulation and radiotherapy on malignant tumors we should destroy only the decayed and the decaying part of the tumor, leaving the live cancer cell to the influence of radiotherapy expecting that those stimulated, vitalized cancer cells under the influence of rays will produce materials which stimulate the endocrine glands to produce ferments which sent to the site of the tumor will stop the cancerous growth.

If it is possible to maintain these theories, then our ideas about cancer therapy must be somewhat revised. It must be admitted that an extensive operation for cancer is an admission of defeat. "I cannot cure it, therefore I cut it off." That is not the ideal. We do it because we cannot help ourselves.

If that is true, the future of cancer therapy must be along chemotherapeutic lines. It must therefore be the task of the biologist and physiologist to isolate these compounds that carry the defense ferments and make it possible that they be produced ad libitum, so that we do not have to resort to dangerous operations with doubtful outcome, but that these compounds are manufactured and we are able to treat cancer as we treat syphilis.

The knife and electrocoagulation are the first steps to the real goal, that is, the development of chemotherapy. Whatever we accomplish simply starts the therapeutic action and is not the curative factor proper.

Let the physiologist and biologist develop these ferments so that we can inject them into the patient and this defense ferment will make the life of the cancer cells so miserable that they will lie down and die instead of the patient.

Question: Did you mean the D'Arsonval current or the Oudin?

Dr. Kolischer: It is simply a commercial expression. It is a high frequency current with a reversion of two millions a second. In the ordinary sense, it is bipolar.

Dr. Fouts: Do you follow your radiation with radium or x-ray?

Dr. Kolischer: In tumors of the belly, cervix and tongue we prefer radium.

Dr. Fouts: You do not figure you are giving a curative dose in the sense of destroying the tumor by radium? If using x-ray, about what percentage of erythema dose and high voltage?

Dr. Kolischer: We used the high voltage in a few bladder cases, and a few months later, as has been observed by others in similiar cases, while the skin was intact, the patients developed a fatty callous with necrosis of the whole subcutaneous tissue. Another man had the experience of two patients dying from toxemia. Personally I am wary about this high voltage apparatus. It is a question whether the dangers do not outweigh the beneficial effects.

Ultraviolet Treatment of Deafness

THOMAS B. LACEY, M. D.

Glenwood, Iowa

BEFORE I began these treatments I had heard that ultraviolet rays were of benefit in certain types of deafness, but I did not believe it. I had a personal friend, however, who had been deaf for fourteen years, so deaf that he could not hear a watch tick and we agreed that we would try out the ultraviolet rays in his case, but when I endeavored to find out the technique I was unable to do so and therefore I started out on my own hook. The result was that about the eighth treatment this man was able to hear the timer at a distance of about eight feet.

The work I started was done in the state institution for feeble-minded children, at Glenwood, Iowa. The first patient from this institution was a girl who to my knowledge had been deaf for fourteen years. She was given twelve treatments and at the end of that time her hearing was a little above normal; it is now six months since she has had a treatment and her hearing is just as good as the day we stopped treatment.

The next patient to be treated was also a girl from the institution. She had catarrhal deafness; at about the tenth treatment her hearing became normal. We continued thus until we had treated about ten patients, which is, of course, not a sufficient number for statistical purpose or proof. The results were slow in coming, the hearing returning at about the fifteenth week as a rule.

The work was done under the supervision of the board of control of the institutions and it so happened that one of the members of the board knew of a very prominent man who had been growing more and more deaf for seven years. He had been told of a man in Chicago who treated deafness by a method of instilling products into the middle ear and he had decided to go to this man for treatment, but, hearing of the work being done upon the deaf inmates of the institution, he decided to have me treat him. His left ear which was practically no good when we began treatments is now the equivalent of his right ear when we started the treatment, an the right ear is now practically normal, although we are still continuing treatment.

The third patient outside the institution was also a very prominent resident of Des Moines. He had an attack of scarlet fever with perforation of the drum, and his hearing is clearing up rapidly. A fourth patient is a man who has steadily been growing deaf and who has had an incessant ringing in his ears. He has now had four treatments. There was no apparent result after the first one, but after the second one he said that the hearing was a little better and that the ringing had diminished. At present he has had no ringing for five days following the last treatment. We have about fifteen other patients upon whom we are trying the treatment but it is too early as yet to give any statistics.

The technique is simple. The patient is stripped to the waist and the initial treatment is to ascertain the amount of ultraviolet ray the patient can stand. We begin with three minutes at thirty inches. If we get no reaction with this we drop the lamp two inches the next time and increase the time by one minute. This is continued until we get a reaction upon each treatment. In the case of the first patient mentioned in his talk, we found no reaction at a distance of fifteen inches with seven minutes of time, therefore we put the lamp at thirty inches. He was given one grain of quinine at 5:30 and at 8:30 the treatment was begun. In this case we dropped the lamp and increased the time until at present we are working at a distance of 21 inches and six minutes time, with a constant reaction each time. We lay the patient on the side, the lamp above them and the rays shining directly onto the drum. We so place the lamp that by pulling the ear up and down the ray shines directly on the drum. We do not use applicators in the ear. We use the air cooled lamp, wide open, in order to get body radiation at the same time.

I believe that in certain types of deafness the ultraviolet rays would save a good many cases. I have been surprised at the number of patients who have been through the hands of different aurists without relief and who have been told that there is nothing to be done—and that their deafness is progressive. In the vast majority of such cases I believe the proper application of ultraviolet rays would give relief.

DISCUSSION

Question. Was the ear drum convex or concave?

Answer. The ear drum was convex, I believe, but I am not an ear specialist.

Q. I have had quite a few cases come to me. In some of them I have found a peculiar condition of the ear drum which has led me to ask the question. In some the ear drum was sticking into the ear.

Q. What is the reaction?

A. The effect of sunburn on the body, especially between the shoulder blades and on the nap of the neck. It is interesting to see the way patients react to the ultraviolet ray. One of the patients has been outdoors all his life and one would expect that he could stand a lot of the ray but quite the contrary is true. He cannot become accustomed to it and he calls me Dr. "Skinner" because I skin him every time I touch him.

Q. Do you test them on the chest or back for resistence?

A. The first treatment determines that. I start at 30 inches with three minutes. If there are no results I drop to 28 inches at four minutes, then to 26 and down. I never give them seven minutes.

Q. Have you tried a combination of diathermy?

A. No sir, I have not, due to a certain experience in treating a patient. When I was ordered to treat by a member of the board of control I requested the board to buy a new ultraviolet lamp but they decided that they could not afford to do so and that I must use my own. My patient lived in the city where alternating current is used, and we use the direct current in our state institution. My car was too small to transport the lamp and my diathermy outfit, and

*Read at Omaha Sept. 3, 1924.

having secured good results with the ultraviolet treatments alone I have not since that time used diathermy.

Q. Do you determine the etiology?

A. I do not. If there is no perforation of the ear drum I treat them. I do not know whether a course of treatment would help these with perforated drums and I have not time to spend treating them for perhaps a year. If the drum is perforated I say that I cannot help them.

Q. What is the length of time necessary to effect a cure?

A. It depends on individuals; from ten treatments up I should say. One patient is receiving his sixteenth, being treated once a week.

Q. You spoke about the effect on the shoulder blades. How do you expect that will effect the ear?

A. I had one of my patients say to me, and he is a very intelligent man, that he could feel the warmth in the ear up to several hours after treatment. Do not ask me what takes place because I do not know, except perhaps a hyperemia in the ear. I take a look every thirty seconds. If the patient is on a pillow he will turn his head one way or the other. I want the light to shine full upon the drum. I do not use a speculum as it is not necessary. I wear gloves and a big mask on my head as I am very susceptible to the ray myself. Last week when I had finished giving treatments I was burned even where covered by my shirt and mask.

Q. Why not try a case on a perforated drum?

A. I have been too busy with those having good drums. It would probably take too much time.

Q. You spoke of the patient who was deaf after having scarlet fever? Was the drum perforated originally?

A. Yes. In those who have been deaf for some time there is no wax in the ear and it usually takes from three to five treatments to tell whether you can do any good or not. One of the first evidence of a possibility of aiding the patient is the appearance of wax in the auditory canal. In two of my patients I have to clean the wax out of the ear whereas before their treatments there was no wax. The ultraviolet ray is a constructive agent. It re-establishes cell activity.

Q. Do you invade the middle ear?

A. No sir.

Q. Have they depressed drum membranes?

A. Not that I could see.

Q. What percentage do you find in which you do not get results?

A. None so far.

Physiotherapy in General Practice

J. G. WALSH, M. D.

Woodbine, Iowa

PHYSIOTHERAPY and roentgenotherapy fill a place formerly much neglected in medical practice. They give us something definite to offer chronic cases which formerly we hated to see come back to us. For instance, old cases of chronic constipation and auto-intoxication were drugged with this and that and in exasperation one sometimes thought of dynamite, but now by the judicious use of the Morse wave generator we have something positive in therapy. With a large pad in the back and one in front (using the three positions over the ascending, transverse and descending colon) and using an alternating current brought up to the patient's tolerance, ten minutes in each position, we treat them every other day and give a lubricating oil at night. In a short time the bowels begin to move regularly and the patient shows a general buoyant poise. The treatment with this current helps to restore tone in lax abdominal walls.

Another class of cases with which we have to deal are cases of high blood pressure and hypertension. By a judicious regulation of diet and autocondensation supplemented by sweats a marked improvement in general health will result. These cases when complicated by nephritis or a sluggish liver are benefited by diathermy to these parts. The improvement is brought about by improving the circulation and by bringing fresh blood to the parts and increasing the katabolism markedly.

Diathermy helps catarrhal deafness and is also a benefit in rheumatism, arthritis, neuralgia etc. Some men are using it in pneumonia and its action is claimed to be almost specific.

Do not forget the use of fulguration or electrocoagulation in the removal of warts, moles, superficial growths, epithelioma, cancer etc.

The actinic ray, both air cooled and water cooled lamps, I think, is the best of the various modalities. In cases of aneuria the improvement is marked. I recall a case of pulmonary and tuberculous peritonitis in a girl of 19 years. She had an afternoon temperature of 101, a pulse of 110 and was generally run down. I used fractional radiation following the scheme of the Rollier treatment. There was a general improvement in her condition and she gained 20 pounds in weight and her temperature and pulse returned to normal in about two months.

I used the air cooled lamp in a case of pustular acne and secured remarkable results. The skin was one solid mass of lesions but it cleared up in five weeks under alternately daily treatments. The lamp is also indicated in eczema, scabies, impetigo, pruritis and almost any itching condition of the skin.

The x-ray, of course, is of benefit in diagnosis and in fractures and it is curative in hypertrophied and suppurative tonsils, cervical adenitis, simple and exophthalmic goiter.

Another phase of the subject which is most important to the physician is that this work is practically all office work. By having an understanding with patients in the beginning, the treatments can be paid for either by cash in advance or at the end of each week. This, I think, is one of the big advantages in physiotherapy.

There are two sides to every physician's life. The broad side which has to do with the alleviation of suffering and the more important, or business side, which has to do with our livlihood. The first is covered in our medical schools and in our magazines but the cost of service is sadly neglected. You can serve the people and do their work for them and be a good fellow generally and wear your life away in service if you will just extend credit.

The best future I find is in a systematic collection of bills. At first one will lose some customers but after a short time he will see results. I send a monthly statement which goes out regularly on the first of every month. In a few months this method will bring in a flock of creditors coming to pay their bills before another statement is received. This is not the time to weaken and say that you are not worrying about their bill, that it was that of the other fellow. If you must say something say that it is a rule of the office. If after three or

*Read at Omaha, Sept. 3, 1924.

four monthly statements one does not receive payment it is a good plan to start a weekly or daily statement, because practically 50 per cent of the accounts six months old are no good and of any over a year old practically 90 per cent are no good. If you look back over your books you will find that the man whom you let ride and whose account kept growing was the man you had to take into court to collect your money.

The last few years "hard times" has been offered as an excuse. Yet these patients buy Henry cars on payment and pay John D. cash for gas. Is it not just as essential that they pay the physicians? Why not "talk Turkey" with these people when they ask for service. Tell them that your service is worth so much and that you expect to have your money by a certain time or, better yet, cash. Why waste your time on Tom, Dick and Harry only to see him riding around in a big car and paying your cash to John D. Awake! Awake! Throw off this lethargy, make your patients pay you. If it is charity ascertain that it is so and then forget about it. Send your patients monthly statements and get them off on the first of the month, not the seventh or the eight, and keep sending them until the patient replies. When you get results, keep it up and do not quit, because if you do you will be back in the same old rut.

After a few years of this you may not have quite so many patients but you will have much more than that, you will find that you have provided your family a livelihood and after all, as I have said in the beginning of this paper, that is the important thing.

DISCUSSION.

Question. I would like to ask what results the doctor has had in the treatment of pneumonia?

Question. I would like to ask the location of the electrodes, whether it is MacBurney's point or the tenth dorsal in intestinal stasis?

Question: Has the doctor had experience with neisserian infections?

Dr. Walsh. Put the pad over the ascending colon and give about ten minutes; then over the transverse colon and give ten minutes, then ten ten minutes over the descending colon.

I have never tried it in pneumonia.

In neisserian infections use diathermy and general raying with the air cooled lamp, and the water cooled lamp locally.

Surgical Diathermy in the Treatment of New Growths of the Face and Mouth

ALBERT F. TYLER, B. Sc., M. D., F. A. C. P.

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SURGICAL DIATHERMY has proved such a valuable method of treating new growths about the face and mouth that a short discussion of the underlying principles and the field best suited to its employment may be well worth while.

HISTORICAL.

In 1891 Nicola Tesla reported that heat was produced when the body was traversed by high voltage currents of high frequency. In 1898 D'Arsonval called attention to the fact that the alternating type of electric current could be passed through the human body in such a manner that the muscular contractions were absent, only a sense of warmth resulting, and he applied the current to treatment of disease.

In 1907 Nagelschmidt reported the use of this type of current in the treatment of certain diseases. At first its employment was in the treatment of arthritis and diseases requiring medical diathermy, but later its employment as surgical diathermy developed. In fact, in 1910, Nagelschmidt was invited to give a demonstration at St. Bartholomew's Hospital, London. At this demonstration he treated three surgical cases. This was the first use of surgical diathermy in England.

Fortunately, I had the opportunity of using surgical diathermy about the same time and published an article entitled, "The Fulguration Treatment of Certain New Growths," in the Urologic and Cutaneous Review 1914. This article dealt with cutaneous new growths. Previous to its publication I had destroyed a sarcoma arising from the trapezium bone (1913) and the patient is still well with no sign of return of the growth eleven years afterward. Besides the case just cited, I have several times amputated the tongue for carcinoma involving the anterior half and have destroyed many extensive new growths on various parts of the body. The ablest surgeons had declared these growths inoperable with the knife.

*Read at Omaha, Sept. 2, 1924.

Fig. 1.—Small epithelioma on the left cheek near the angle of the mouth successfully treated by surgical diathermy.
Fig. 2.—Ulcerating epithelioma on the right cheek successfully treated by surgical diathermy.
Fig. 3.—(a) Sebaceous cyst arising from the lower eyelid, successfully removed by surgical diathermy.
Fig. 3.—(b) Same patient after removal.

William L. Clark, Geo. E. Pfahler, Gustave Kolischer and others have employed surgical diathermy extensively over a long period of time.

PRINCIPLES.

1. Voltage: As described by Tesla, D'Arsonval, Nagelschmidt and others, the electric current employed in surgical diathermy must be of the alternating type. The voltage must be sufficiently high to force the current through any amount of human tissue which the surgeon desires to treat. The voltage found must practical varies from 25,000 to 60,000.

2. Interruptions: The current must have not only the above voltage but must be interrupted very rapidly, at least 40,000 per second and some recommend as high as 500,000 or more per second. When the interruptions are too slow the patient is annoyed by muscular contraction. This fact gives a simple test to determine whether a given machine produces a type current suitable for this work. Muscular contraction or "faradic," as called by some, should not be present.

3. Amperage: Most machines on the market at the present time are provided with a meter for registering the number of milliamperes passing through the part being treated. In medical diathermy the meter gives very valuable help in regulating the current flow. On the other hand, in surgical diathermy, the purpose is destruction of the tissue treated. Consequently, the effect on the tissues under observation gives the surgeon the most valuable information.

4. Time: Sufficient current should be used long enough to blanch the entire mass of malignant tissue and some surrounding normal tissue to a dirty gray color. It is unnecessary and undesirable to char the tissue, the best effect being produced by a complete dehydration without charring.

5. Method of Action: The name "surgical diathermy" gives some idea of the method of action of this current, that is, we have a heat through the tissues. I may illustrate this a bit more graphically, perhaps, by calling your attention to the filament in the ordinary incandescent light bulb. In the light bulb a fine wire filament made of material which is a poor conductor of electrictiy is compelled to carry the current. As a result of the resistance to the flow of the electric current the wire becomes white hot.

In the use of surgical diathermy the electric current of the character described above is forced through the tissues. The tissues are poor conductors of electricity and because of this fact they become heated to the point of dehydration with death of the cells.

During the application of surgical diathermy the electrode is cold, the heat originating in the tissues themselves, and later, after prolonged use, slightly warming the metal electrodes by radiation to it. This is in strong contrast to the red hot soldering irons or the Paquelin cautery so frequently used by the surgeons. In this case the electrode is red hot when introduced into the tissues, destroying the tissues by radiation of its own heat. Of course the greatest heat is nearest the electrode, consequently the tissues surrounding the red hot soldering iron become charred. Charred tissue is chiefly carbon which has a great power to prevent the radiation of heat. As a result the destructive process is limited to the immediate vicinity of the hot iron. Malignant cells situated beyond this zone of heat are only slightly affected, if at all, and still continue to grow.

6. Method of Application: In surgical diathermy a large indifferent electrode, usually a piece of block tin, is placed in good contact with the bare skin on the body some distance away from the field of operation. For example, if one wishes to operate upon the face or mouth the indifferent electrode can be placed on the back between the shoulders. Since the amount of current passes through both electrodes, the small or active one will become the one around which the tissue is destroyed. Figure 10 shows digramatically how this occurs. So great may become the heat about the active electrode that the needle itself may burn. Such heat is unnecessary in clinical uses. After the parts to be treated have been thoroughly anesthetized, preferably using 0.5 of one per cent novocaine solution to which has been added 1/1000 adrenalin solution, the active electrode is placed in contact with the tissues and the current turned on. As the tissue blanches about the needle it is pushed slowly forward into the tissue until destruction has occurred to the desired depth. The needle is then removed and an adjacent area is treated in the same manner. This process is repeated until the entire area is covered.

If the mass of tissue is small it may be brushed off with a piece of gauze. If it is large, a pair of curved scissors may be used to advantage to trim it off, being careful to keep away from bleeding. The wound is then dressed with a moist mildly antiseptic dressing which encourages rapid separation of the slough and keeps the parts free from infection. Within

Fig. 4.—Large ulcerating epithelioma of the ear involving the cartilage, successfully removed by surgical diathermy.
Fig. 5.—Multiple epitheliomas of the nose and cheeks in a patient 89 years of age. The larger one on the nose involved the cartilage. Successfully removed by surgical diathermy.
Fig. 6.—Multiple ulcerating epitheliomas on the nose and face involving the mucous surface of the right lower eyelid. All successfully treated by surgical diathermy.
Fig. 7.—Destructive ulcerating epithelioma involving the left half of the lower lip and extending around the angle of the mouth on to the upper lip. Successfully treated by surgical diathermy.

a few days after the treatment the tissue which has been dehydrated begins to separate from the normal tissue underneath. The normal tissue appears red, and vigorous granulations soon spring up. This leads to rapid healing resulting in epidermization with a small pliable scar.

In cases where a large surface has been destroyed, healing may be hastened and considerable time saved after the slough has come off by sterilizing the wound with a few applications of ultraviolet rays from the water cooled quartz lamp. When the wound is sterile a perforated celluloid window may be placed over it to keep the dressings from touching the granulations. In moderate sized wounds the celluloid shield sold to protect vaccination wounds has proved valuable. This is easily obtained, readily applied and can be retained without difficulty. Heavy dressings moistened with strong antiseptic solutions retard the advance of granulation tissue in wounds. Given air and a dressing which does not injure them, their growth is remarkably fast. Of course, as soon as the wound becomes level with the skin surface, the growth of the granulations must be retarded so that epidermization can take place. Skin will grow only on a level surface, refusing to extend into a hole or up over a hump.

Daily applications with radiant heat from a theraputic lamp increase the blood supply and are conducive to the best results. We have found great value in gentle masage administered directly after the application of radiant heat. The massage not only increases the circulation but restores the parts to early motility and promotes the formation of a soft pliable scar. This is especially important in treatment about the face.

Cases Suitable.

1. Small Lesions: Surgical diathermy is valuable in the early treatment of small lesions on the skin of the face. These can be removed quickly, painlessly, without hemorrhage and no postoperative dressing is necessary. The spot left after the treatment will be no more noticeable than the growth was before treatment and in many cases much less noticeable. The patient can wash the face as though nothing had been done. Healing is complete in a week or ten days.

2. Operable Lesions: In these the patient has the choice of surgical diathermy or the knife with the same advantages in favor of surgical diathermy as mentioned above.

3. Inoperable Lesions: These are usually called inoperable because of location in some difficult or inaccessible place, or because they involve an extensive area the removal of which would result in too much mutilation or because they are so vascular that death might occur from hemorrhage during surgical removal.

(a) Inaccessibility: The various types of applicators used in surgical diathermy make it possible to reach any portion of the face or mouth or even in the nose where ordinary instrumentation is possible. The needle electrode is especially well adapted to the treatment of growth on the eyelid or at the inner canthus, or on the lips or cheeks. A longer hat pin electrode covered with rubber gives access to the nares and nasopharynx. In especially difficult cases the rubber covered wire, such as is employed in urological work, can be used.

(b) Extensive involvement: Here the entire mass can be isolated by going around the margin of the growth well out into the healthy tissue. The action of the electric current seals the lymphatics, thus blocking danger of cells passing beyond the operative field during the manipulation incident to removal.

(c) Vascularity: Not only are the lymphatic vessels sealed but the blood vessels as well. In vascular growths nourished by vessels up to 60 mm. in diameter the mass can be removed without loss of blood. In cases of this character the patient should be hospitalized for a few days until the danger of secondary hemorrhage has passed, although this very rarely occurs when proper technique is employed.

Advantages.

In the body of the paper it has been necessary to enumerate many of the advantages of surgical diathermy. They may be briefly summarized as follows:

1. Accuracy of Control: The current used for this work can be adjusted to any desired effect so that work may be done with perfect safety on the margin of the eyelid, about the inner canthus of the eye, in the nares or the nasopharanyx.

2. No Bleeding: The current seals the vessels as the work is being done so that no loss of blood occurs. This is especially valuable in very vascular growths or in the enfeebled patient where loss of blood would be a serious drain upon his vitality.

3. Painless: The great majority of the work can be done under novo-

Fig. 8.—Photograph of a patient suffering from extensive destructive epithelioma of the left half of the lower lip. Successfully treated by surgical diathermy. Photograph taken following removal.

Fig 9.—(a) Side view of extensive cauliflower epithelioma involving the right cheek.

(b) Front view of the same patient showing the thickness of the growth which extended through the mucous surface of the cheek with a small fistula.

(c) Same patient after successful removal by surgical diathermy.

cain-adrenalin anesthesia with occasional use of cocaine application to mucous surfaces. When general anesthesia is necessary, remove all ether from the room before starting actual work, as a light spark may cause a serious fire.

4. Absence of Afterpain: Patients remark about the absence of pain following the treatment. Even in amputation of the tongue the patient is quite free from pain other than the soreness on movement or touching .

5. Scar: The scar is small compared to the work done and is pliable. Where large areas have been removed, plastic surgery is a great help in restoring the parts.

DISCUSSION

CHAIRMAN SHERMAN: This is surely a most able paper and quite near to the heart of most of us, especially most of those doing this class of work. Needless to say it is not quite so near to the heart of the surgeon. He still is to be convinced. To us it is quite plain we can block off cancer and stop chances of the cancerous cells being distributed and used as foci to transmit cancer to some other section of the body. This is the ideal treatment along this line, the surgeons to the contrary notwithstanding.

Q. I would like to hear the doctor's technique.

Q. I want to ask if he used indirect current diathermy in some of the smaller ones?

Q. I would like to ask what result he had in his treatment of cancer of the cervix?

Q. We were taught in operations on the ephthelium of the lip that it was useless to remove the growth unless we removed the cervical glands. I want to ask if the doctor used x-ray or radium treatments following up these cases, and what is the percentage of recurrences?

Q. I would like to ask about the proposition of using a local anesthetic hypodermically, surrounding such groups as are shown, with practical reference to the possibility of that ever-present danger with reference to the use of the knife, proliferation of the cells of the cancer into the adjacent tissue?

Q. The doctor showed work on only the hands, face, neck and ears. Couldn't it be used in the breast, and if so, what percentage of proliferation have you had, and what percentage of secondary hemorrhage have you had in those you treated?

DR. GUSTAVE KOLISCHER: I think it speaks for itself and does not need much comment. My personal contention is this: I can not conceive of any surgeon who ever practiced this method in proper cases ever again using any other method of dealing with malignancy. We do not endanger the patient's life, and statistics have shown that the results are far superior to any we have ever accomplished with the knife.

In order to keep away from the infected area we use blocking of the nerves. In some cases, as in extensive cancers of the mouth, local anesthesia is impractical. It is not a good plan to use ether. You will succeed by taking one-third ether and two-thirds oil and injecting it into the rectum, and inside of one-half hour you get a complete anesthesia that will last as long as you want it. After you are through, wash out the rectum. You can operate cases that could not be touched with the knife. Even if you do not cure, you get splendid palliative results.

DR. TYLER, (closing): I will attempt to answer the questions in the order in which they were asked.

Some one asked for my technique. In the paper I attempted to give the underlying principles of technique. After anesthesia has been produced either by local anesthesia, or as Dr. Kloischer suggested, in extensive cases, by rectal anesthesia or some other type of general anesthesia, the indifferent electrode is placed on some neutral part of the body, as on the back or between the shoulders, because frequently the patient is lying on the back and it is easy to keep in good contact. It can be placed on the abdomen or almost any other part of the body. Then the active electrode is placed against the tumor tissue and the current is turned on, a sufficient amount of current and sufficient time being used to blanch the tissues thoroughly to greyish white, taking an area adjacent to that and continuing until all the diseased area and surrounding normal bit of tissue have been destroyed, in order to be thorough.

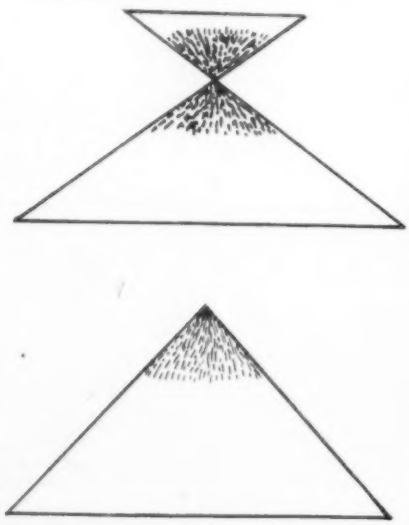

Fig. 10.—Drawing showing the way in which the maximum point of heat moves toward the smaller of the two electrodes. When a point electrode is used the heat is greatest immediately around the point.

The question was asked whether we used indirect diathermy in the small growths. I do. The technique for that is familiar to most of you, I am sure. In that case you connect to a middle binding post on the machine, and allow the current to pass from the machine through the patient to the ground, instead of using the bipolar method. You can connect the patient to the electrode by having him hold a metal electrode in his hand, and with the needle in your own hand, allow the current to pass from the patient out through the needle to the ground. Some think it is less painful; otherwise, the technique is about the same. Use a dosage until the tissues are blanched and dehydrated.

As to treatment of the cervix: I will frankly confess I have not used surgical diathermy in treatment of the cervix; for no reason, perhaps, except that I am equipped with x-ray and radium and have preferred to use them. It is adaptable, and men who have used it, such men as Dr. Kolischer and Dr. Clark, report equally good results.

It was also asked whether we used x-ray or radium in treating glands about the jaw in cases of epithelioma of the lip. I do. We should use the same care in treating malignancy about the mouth that we would if we are going to use the knife to remove it. Surgical experience, extending over a long period of time and covering thousands of cases by the most competent men, has proven that the percentage of cures of epithelioma of the lip is much greater where a block dissection of the glands is made at the same time. By using x-ray or radium to treat the glands, the same thing is accomplished that the surgeon accomplishes by a block dissection of the glands, and we are able to do it with less discomfort to the patient.

As to the percentage of recurrences in injecting with the hypodermic needle I would say that in using local anesthesia, one should be careful not to insert the needle into the tumor, but to go into healthy tissue beyond the tumor to produce anesthesia. The needle should not be inserted through the tumor. That is never done. As Dr. Kolischer suggested, in some cases where infiltration anesthesia cannot be used one can use nerve block anesthesia by blocking off the

nerve proximate to the location of the growth.

Some one asked about using this in cancer of the breast. I have not used it in those cases except in extensive neglected cases where there was already an ulcerating growth. My reason is that if the growth is not ulcerative, it can be removed surgically and primary union results. If we would take the breast off by diathermy, we have healing by granulation, and I have preferred to give the patient healing by primary union. Other men may not feel that way about it.

Some one asked about the percentage of secondary hemorrhage. That was in connection with tumors of the breast. I have already answered that. I have not had experience in that location. I have used it about the face and mouth for a period of twelve or thirteen years, and have had only one secondary hemorrhage.

Dr. Kolischer suggested the use of anesthesia, which is a very valuable method to use in extended growths in the nasal pharynx. It is impossible to show photographs of those cases, so we have not shown lantern slides of that type of case.

CHAIRMAN SHERMAN: I wonder if it is perfectly clear regarding the application of the active electrode—just how much it is inserted and how it is used? That is one point many people are tied up on.

DR. TYLER: I will attempt to make that a little clearer. You will recall that in reading the paper I made a couple of rough sketches showing how to bridge the smaller one of the two electrodes when using the bipolar method. In treating the growth, the needle, if you are using a needle, or the electrode, first is put in contact with the surface of the growth, if it be a small growth. Then the current is turned on, and as you watch it you will notice the tissue turns a dirty greyish white. That should be carried on until all the growth is destroyed. If one application of the needle destroys it, well and good. If it is larger, then we must not only treat that one area, but we must take areas adjacent to it and so go on around until the entire growth is destroyed. In the larger growths I prefer to go in healthy tissue outside the tumor, first making a ring around the tumor. If the tumor involves just the skin so that it is freely moveable, then in making this ring I am careful to go clear through the skin with the needle. That blocks the lymphatics and the vesels before starting on the growth itself.

In the larger growths, after we have dehydrated as much tissue as possible, we remove the tumor tissue usually by cutting it off with a sharp curved scissors, being careful to keep within this tissue so as not to open up bleeding areas. We can see if we have gone deep enough to destroy the entire growth, and keep on until we have it all dead. In some of these cases like this appendicular growth to the lobe of the ear, you can take the whole growth off en masse.

Q. Is it advisable to use a strong current for a shorter time, or a lighter current for a long time?

DR. TYLER: I think you will get more satisfactory results by using what I might call a medium current —not strong or not weak—one which will act within a few minutes' application giving you the dehydration, but not strong enough to char the tissue about your needle. You do not want to char it. You want to dehydrate it. If you use too much you will get charring. Produce heat in the tissue and destroy it without charring.

Some Experiments in X-Ray Protection

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THE writer wishes to acknowledge the aid and many suggestions so kindly given in the conduction of these tests, by Mr. John T. Norton, Director of X-Ray Laboratories at the Massachusetts Institute of Technology.

From the time of the first experiments with discharge tubes, it has been known that high voltage vacuum discharges have detrimental effects on the health of the observer. Several severe cases resulting in death were recorded before the exact cause of the malady was detected. The first workers in the manufacture of radio vacuum tubes contracted cancers on their arms and hands from the same fundamental cause.

One is often deceived as to the ability of x-rays to continue their path through solid material. A wall of wood or even of concrete only diminishes the intensity, and does not destroy all of the rays. In an experiment, x-rays sent out by an especially powerful tube, affected a photographic plate across the Seine river, a distance of a quarter of a mile.

X-rays have no detrimental effect for a short exposure such as administered to a patient in a medical observation, but for one who constantly uses or experiments with these rays, protection is essential. The rays first produce burns, similar in appearance to sunburn. If the exposure is continued, the burns go deeper, resulting in open, nonhealing sores and finally in cancer of the most sinister character. Several serious mishaps have been due to lack of knowledge along this line, on the part of the operator of the tube. One physician, in a effort to determine the "limiting dose" of his newly acquired tube, that is to find the exposure which, after a period of two weeks, just causes reddening of the skin, subjected his patient to a certain exporure. As soon as the current was turned off and no reddening was visible, the exposure was increased with a similiar result. Successive increases proved equally disappointing to the physician, who decided that the tube was at fault. Consequently he returned it to the makers with an explanation of its failure.

An instance is related of two men working side by side without sufficient protection from the x-rays with which they experimented for several years, being rendered sterile. The result was attributed to the action of the rays.

It is not the purpose of this paper to discuss physiological effects, but sufficient has been said to show the necessity of protection.

Protection involves the absorption of the rays. In order that absorption be fully understood a consideration of the nature of the x-ray itself must be made.

X-rays are electromagnetic waves of energy. They might be compared to heat waves; both are wave motions, energy radiations of high frequency.

These rays are produced when electrons of very great velocities

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strike the surface of a metal. Two kinds of x-ray tubes are used, the gas filled and the Coolidge types. Since the latter has practically superseded the gas-filled type, let us consider the production of x-rays in the Coolidge tube.

It can be demonstrated in the laboratory to the satisfaction of the most cynical observer, that many materials are composed of unit particles called atoms. There is every reason to believe that all material is so constructed. These atoms are made up of a nucleus around which electrons are grouped in different numbers and in different formations. The distance between nucleus and electrons is so great in comparison to the size of the particles themselves that if the atom were greatly magnified, it would be comparable to the solar system with the nucleus the sun, and the planents the electrons. However, the electrons form themselves in very definite positions with respect to the nucleus, acording to the electronic theory now accepted by the leading investigators of the subject. These electrons, experiments of the most delicate order show, group themselves in rings around the nucleus, several rings sometimes being present, one outside the other. Furthermore there are no 'stray' electrons between the rings. Electrons of every element are identical, carrying a negative electrical charge of a fixed amount. The nucleus is positively charged and holds the electrons in their place by an electrostatic attraction. These electrons are thought to rotate at very great speed around the nucleus, their centrifugal force just equal and opposite to the electrical force tending to draw in. Then, just as the centrifugal force of the earth as it revolves about the sun, is just equal to the gravitational force of opposite direction existing between these two planents, the electron continues to revolve in its orbit about the nucleus of the atom. In order to have a neutral atom electrically, the total negative charge of all electrons must just equal the positive charge of the nucleus. One element or combination of elements differs from another by the number of positive charges of the nucleus and therefore the number of neutralizing electrons around this central point. Just as a particle on the rim of a revolving flywheel has a greater energy than a particle of equal mass at the hub, the electron revolving farthest from the nucleus has the greatest energy. If then a particle jumped from the outside ring to the inside ring, energy would be given up in some form, and conversely, if an electron jumped from an inside ring to an outside one, energy would have to be supplied to the system from some outside source.

It can be shown that when a high voltage is applied between cathode and anode of an x-ray tube, there is an electrical force on any charge of electricity between these electrodes. In the Coolige tube, when the filament is heated in incandescence by the passage of a current, electrons are "boiled" out of the filament into the highly evacuated space of the tube between the electrodes. The force of the electric field exerted on these electrons causes them to attain tremendous velocities toward the anode. On reaching this electrode, the electron enters the open network of the atomic structure of the tungsten anode and before it has traveled far, strikes an electron in one of the rings of a normal tungsten atom with such force that both the striking electron and the one struck, are knocked without the range of the nucleus. This leaves a vacant space in one of the rings of the atom, which must be replaced by an electron from a ring farther out, most likely from the ring next to it, but in some cases from two rings, three, or even more, out.

Let the ring closest to the nucleus be called the K ring; the next one farther out, the L ring; the third out, the M ring, etc. Then if an electron is replaced in the K ring, greater energy is liberated than if one is replaced in a ring farther out, and furthermore the farther an electron falls to this ring, the greater will be the energy given up. If an electron falls from the L ring to the K ring, a radiation called Kα will be produced; if from the M ring, Kβ etc. This series of radiations, differing in energy and therefore in frequency, is called the K series. When electrons are replaced in the L ring from the M and N rings, Lα and Lβ radiations respectively, are produced. These L radiations differ slightly in frequency between themselves, but differ considerably as a group, from the K series. A similiar M series is also known.

Ordinary visible light can be broken up into its spectrum of different wave lengths, by a glass prism or a defraction grating. X-rays are however of too short wave lengths for the successful operation of these methods. X-rays can only be defracted by crystals, the cleavage planes of the crystal taking the place of the rulings of the defraction grating. When a beam of x-rays is so analyzed, its spectrum appears:

K series L series M series

Wave length increases to the right. Since frequency is the reciprocal of wave length, frequency increases to the left. The α lines have the lowest

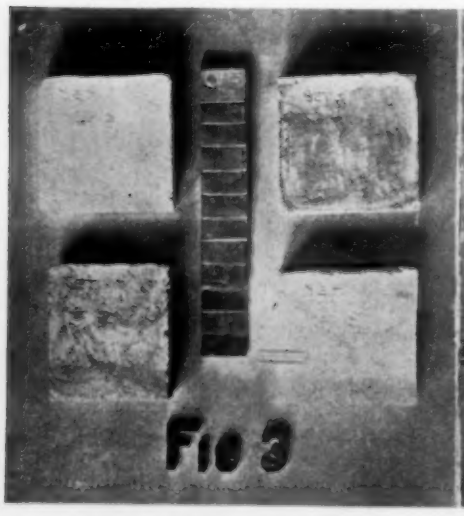

Fig. 1.—Samples on cassette ready for exposure.

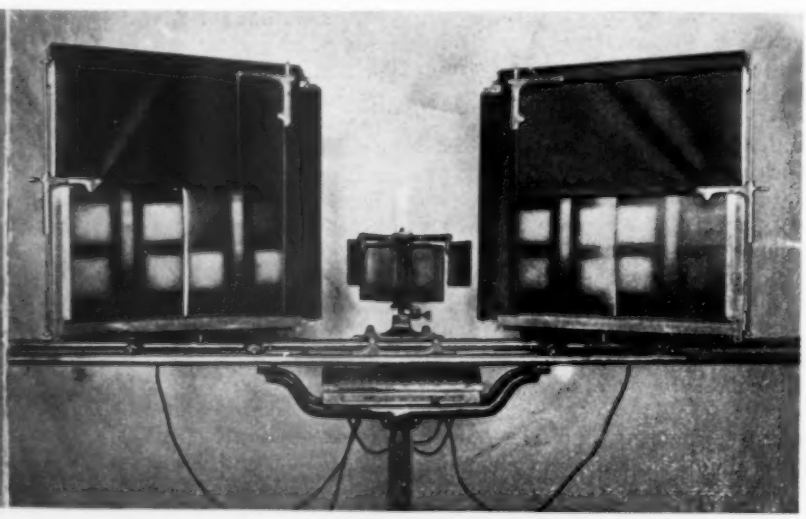

Fig. 2.—Method of interpreting samples.

frequency in each series.

The penetration of an x-ray increases with the frequency. Thus the K radiations have greater penetrating powers than the L waves, and are called "hard" rays. The quality of an x-ray then depends upon the velocity of the electron from the cathode,—the ability to knock electrons from the inner rings of an atom.

The kinetic energy of an electron may be expressed

$$K.E. = 1/2\ mv^2$$

where m is the mass and v the velocity of the electron. This may be set equal to the product of the voltage between the plates, and the charge on the electron, or the work done on the electron in carrying it across the space between the electrodes.

$$V = \sqrt{\frac{2Ve}{m}} = K\sqrt{V}$$

where K is a constant. Thus, velocity increases with the square root of the voltage. This explains why increasing the voltage on a tube increases its penetrating power. Radiations of energy leave the anode and go in all directions, the greater part going in one direction, however, due to shape of the anode.

When these rays enter another metal the same process is repeated to a lesser degree. X-rays knock electrons from the material struck, causing secondary radiation. This secondary radiation causes a great deal of trouble in radiography, especially in taking pictures of metals.

Absorption Of X-rays.

Some materials hold back or absorb x-rays to a greater degree than do others. If this were not so, radiography would be impossible. The difference of intensities on the photographic plate is due to the greater or lesser exposure to the rays passing through materials of different densities.

A mathematical relation has been discovered which represents the conditions within a certain range, with some degree of accuracy. Let I_0 be the intensity of a homogneous beam of x-rays striking a material of thickness t. The intensity I, after the beam has penetrated the plate may be expressed:

$$I = I_0\ e^{-\lambda t}$$

where λ is the coefficient of absorption of the medium. Experiment has shown that λ varies as the 5/2 power of the wavelength.

Further tests have shown that, using the same wavelength with different absorbing screens, as long as the wavelength was not too close to that of the characteristic radiation of the absorbing screen, the coefficient of absorption was proportional to the fourth power of the atomic weight of the material used as the screen. The "heavier" the material, the greater its power to absorb x-rays.

The energy of an x-ray on striking a material substance, is dissipated in two ways; in producing "scattered" radiation and "characteristic" radiation. As has been shown, increasing the voltage across the tube increases the quality, that is the penetrating power of the rays given off. It has also been shown that the voltage across the tube determines the velocity of the electrons between cathode and anode and therefore the energy of the x-ray. Because there are electrons striking the anode with less velocity than others, x-rays varying in energy are produced. X-rays with less energy, striking a material substance may not have sufficient energy to disrupt the atomic structure of the material struck, that is to knock electrons out of the atom, but still on being stopped, must give up their energy. Being stopped more or less abruptly, according to chance, energy radiations of various frequencies are produced. These radiations of random wave length go in all directions and are called scattered x-rays. They are the result of the absorption of one component of the beam of x-rays coming from the anode.

However the rays of greater energy, produced when the fastest cathode rays strike the anode, are able to actually break up the structure of the surface layers of atoms of the material struck. They are able to knock electrons from the rings of the atoms as has been explained, and so doing produce radiations characteristic of the atomic structure of that particular material. These are the characteristic secondary radiations and are the result of the absorption of the second component of the original x-ray beam.

The term"white" radiation and "scattered" radiation are sometimes used synonomously, but there is really a fine difference between them. White radiation, properly defined, comprises those primary x-rays which are below disruptive energies. Scattered radiation is the result of white radiation striking a material substance.

The ability of a substance to stop x-rays, that is to absorb their energy, is determined by the strength of the electric field existing between nucleus and electrons. The greater the force between these two components of the atom, the greater the amount of energy which must be given up in displacing an electron.

The materials of greatest atomic weight have the greatest attraction

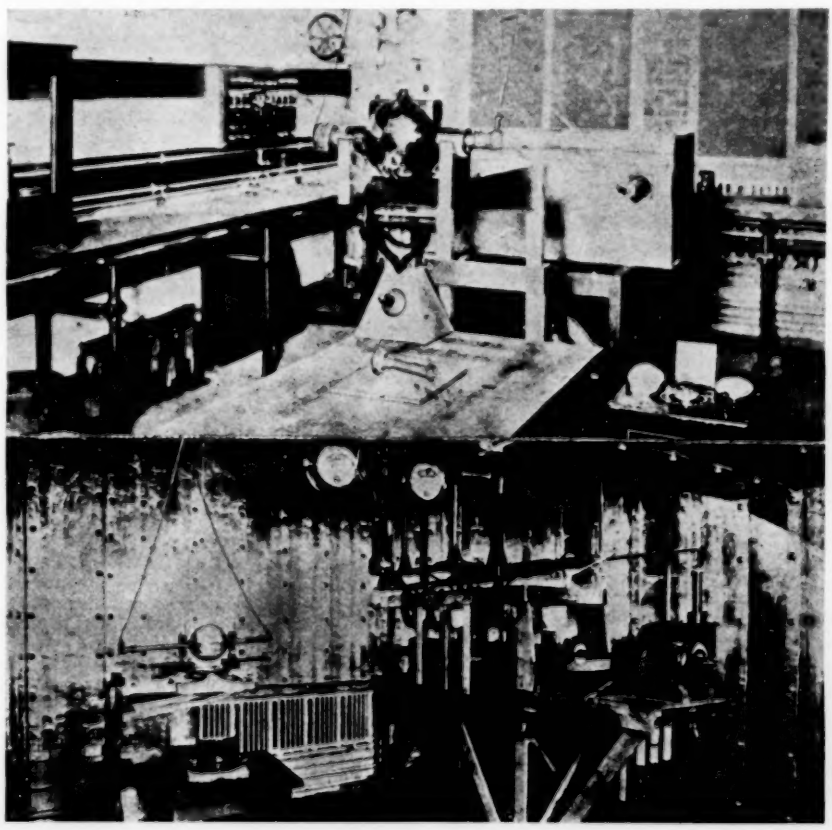

Fig. 3.—Photographs showing the arrangement of the tube and the substances to be tested.

between nucleus and electrons. That is to say the nucleus of the atom of a heavy material carries a greater positive charge than that of a lighter material. This explains why absorption increases with the atomic weight of absorbing materials. In choosing materials of protection then we must look to the materials of the highest atomic numbers.

Purpose of Test Made.

In order to compare the materials commonly used for protection against x-rays, and especially to determine the value of the substitutes for lead in wall covering, a series of tests were carried out.

Equipment Used.

The two machines used in these tests are the property of the Massachusetts Institute of Technology. The smaller is a radiator type of tube built on the Coolidge principle and is the size commonly used by the medical profession. This tube is incased in a lead-glass shield. The second is of an especially large type made by the general Electric Company. It operates on voltages as high as 250,000 and has the power to "look through three and one half inches of steel. This tube is similiar to the one used at the United States Arsenal, at Watertown, Mass., for finding flaws in iron and steel castings. Radiographs show their pockets or other imperfections within the body of the metal, a very valuable function in the production of gun parts and munitions. This tube has no radiator but depends upon the radiation of heat from the glass, to prevent overheating. The room in which the tube is operated, is lined on all sides and ceiling with lead. The lead is a quarter of an inch thick and is protection for the rooms on the side and above, the tube being on the ground floor. The tube and control meters are observed through an ingenious periscope from outside the room. Although light rays are reflected by the mirrors of the periscope, x-rays are not so reflected, and the observer is protected by a quarter of an inch of lead.

The cassette or film holder is a box about half an inch thick faced on one side by a thin sheet of aluminum. The back is hinged so that the film may be inserted with facility, a spring clamp holding the back in place and preventing the leakage of light. The film fits between two radioactive screens. These screens fluoresce when struck by x-rays, thus intensifying the effects on the film. In this way the same impression may be made in a small fraction of the time that would be required if the screens were not used. The active life of the tube is therefore greatly lengthened.

Most of the films used in these tests were of the non-abrasive type made by the Victor X-Ray Corporation, emulsified on both sides. Eastman "duplitized" films were also used. Both of these makes gave very satisfactory results and both yielded to the same developing process. The films were developed for three minutes.

Method of Test.

A view of the cassette with four samples of plaster to be tested, is given in Figure 1. The film lies under this thin aluminum sheet between the fluorescent screens. Between the samples is shown a lead "staircase," sheets of carefully measured lead piled one on the other, each projecting a half inch farther than the one above. The letters at the bottom were cut out of one eighth inch lead and were placed in the picture to facilitate recording.

The cassette is laid on the table directly below the x-ray tube. X-rays fall on this frame, being absorbed in different degrees by each separate sample and by each thickness of lead. By comparing the color on the negative with the colors in the lead staircase, corresponding intensities may be matched and the value of the material tested, may be determined in millimeters of lead.

The negatives were placed in front of a screen illuminated by strong lights, as shown in Figure 2. A rather accurate comparison could be made.

In taking all radiographs of plasters, the large machine was used at a height of 36 inches above the cassette. This tube is arranged in its holder so that it may be placed at any height or position with respect to the table. Heights are controlled by a crank and read on a calibrated standard. Angular positions are read in degrees on a calibrated circles. All samples of plaster were made 5/8 in. thick. It was desired to have the samples about the thickness that plaster could be put over laths on a wall. For this heavy material 5/8 or 3/4 in. would be the maximum. When the percentage mixture is spoken of in the following pages, percentage by volume is understood.

Report on Tests.

The first materials that were used to make the tests simple were barium sulphate and concrete. The concrete was made up of one part of portland cement and one part sand. In this connection it is necessary to add that if sand is used, it must be carefully screened, because stones that might be used with the cement are comparitively translucent to x-rays.

Samples were made with different quantities of barium sulphate in proportion to concrete; and further, with the same proportions, the mix was made very thin for some samples and very thick for others. The thin plasters would have been of no practical use, but from an experimental point of view it was desired to determine whether the time required for the plaster to set changed in any way the absorption powers.

The ratio of barium to concrete was first made 5 to 1 and then reduced to 3 to 1.

Conditions for Test.

Voltage .....210 kv.
Current .....4 ma.
Exposure .....10 seconds

Under these conditions the difference between the samples of 5 to 1 and 3 to 1 was found to be only equivalent to 1/4 mm. of lead. The 5 to 1 ratio with plaster of ordinary consistency was equivalent to 1 3/4 mm. of lead. This value was reduced to 1.5 when the ratio was reduced. The difference between the very thick and very thin mixes was perceptible but the difference was so slight that it might be disregarded. The 5 to 1 material, while it mixed and set well, and was strong enough to keep itself on the wall, would not stand much of a blow, and therefore would not be satisfactory as a wall covering.

The next test was made on specifications advocated by a paint and varnish company, producers of lead paints. The samples were made up of their barium sulphate and lime plaster. The plaster was made of one part slack lime and one part sand. The mix was, two parts lime plaster and one part barium sulphate. These samples were also made thin, regular and very thick. All were painted with one coat of the company's plaster primer and three coats of 1 ad barium paint of the same company..

Conditions of Test.

Voltage .....210 kv.
Current .....4 ma.
Exposure .....10 seconds

These samples, although teste under the same conditions as those in the test preceding, did not show up so well. Even though the samples were painted with four coats of paint they showed only an equivalence of 1 mm. of lead. In this case the difthick mixes was not perceptible. On ference betwcen the the thin and this same film was placed a 3 to 1 sample from set No. 1. The differ-

ence was very marked, as would be expected, the one having six times as much barium in proportion, as the other.

A test was then made using the same proportions of barium sulphate but replacing the lime plaster by concrete. This concrete was again of equal parts portland cement and sand. This substitution improved the mix by a good quarter millimeter of lead.

If comparisons were to be made between samples made from the paint company's barium sulphate and samples from commercial technical barium, a test was required to determine whether the materials were similar. Samples were made exactly similiar except for the kind of barium used. This experiment showed the bariums to be unlike, the technical product being much higher in absorption than that of the other make, in fact a difference of 1/2 mm. of lead equivalent was observed.

The difference between the samples made with cement and with plaster was due to the difference in densities of cement and lime. These densities were measured, the portland cement showing a density of 282 pounds per cubic foot and slack lime, 209 pounds per cubic foot. This shows that the cement was 1.35 times as heavy as the lime.

To determine what power of absorption had been added by painting the samples, a test was made which showed the unpainted blocks to be equivalent to 3/4 mm. of lead or a difference of 1/4 mm. added by one coat of primer and three coats of lead barium paint. The paint company's specifications would make a satisfactory wall as far as strength is concerned, this mixture giving a coating about as strong as ordinary wall plaster. Since the absorbing power of this material was only equivalent to 1 mm. of lead when painted, it was determined to increase the barium content in proportion to the amount of plaster used. Accordingly the ratio was increased to equal parts of plaster and barium, one sample painted and the other left plain. The difference in the painted sample and the plain one was very slight, both being equal to a little less than 1 1/4 mm. of lead.

Since lead has always been considered the most practical absorption medium for x-rays, some tests were made with oxides of lead, red lead and yellow lead (litharge).

Conditions of test:

Voltage .....210 kv.
Current .....4 ma.
Exposure .....17 seconds

First some samples were made 2 parts barium sulphate, 1 part lead with 2 parts concrete (1 part cement and 1 part clear sand). Using both the red and yellow lead, two specimens of each oxide were made, so that one of each could be painted. The ones unpainted were equal to 1 3/4 mm. of lead, while those that were painted seemed to show no improvement; at least the improvement was of no practical value. While 13/4 mm. was the best equivalent so far found, these samples when tested for strength proved valueless as a wall covering. The introduction of the lead seemed to have destroyed the hardening power of the cement, and the resulting mixture could be crumpled in the hand, even after two weeks time.

The proportion of lead was still farther increased, squares being made with 1 part barium, 1 part lead and two parts concrete. This mixture was of no great strength but its absorbing power was increased to equal that of 2 1/4 mm. of lead. It is seen from this fact that when barium is replaced by lead oxide the absorption increases. The atomic weight of barium is 137.4 while that of lead is 207.

Since the lead destroys the hardening power of the cement, an attempt was made to substitute lime plaster for the cement. The conditions for this test were the same as in the preceding test. These samples were equivalent to 1 3/4 mm. when cement was used. This again emphasises the superiority of cement plaster over plaster in the power to absorb x-rays. However, the substitution of the plaster improved the strength of the mix a great deal, this combination being usable as a wall covering, but none too strong to resist blows.

For the next test, plaster of paris was used instead of plaster or cement. Samples were made using plaster of paris in all proportions with barium sulphate, from two parts of barium up to six parts, for one of plaster of paris. It was known that the greater the amount of barium per unit volume used, the greater the absorption of the plaster. It was only a question of finding at what point the strength of the mixture fell below a desirable value.

Conditions of test:

Voltage .....210 kv.
Current .....4 ma.
Exposure .....10 seconds

Two parts of barium to one of plaster of paris was equal to 1.25 mm. of lead. This was just the value noted when cement was used as the hardening agent. When lime plaster was used in the same proportion, the value was 3/4 mm. When the proportion was increased to 6 to 1 the radiograph showed 1.75 mm. equivalent. This also corresponds favorably with the value obtained using cement. Since these two are similiar in their absorbing powers, their desirability would be determined by other considerations such as strength, cast, and ease of application.

Tests showed that with this proportion of barium, mixtures made with plaster of paris were tronger than those with portland cement. The former was not so brittle as the latter and would not yield so readily to a blow. However, the case of application favors the cement because plaster of paris hardens quickly. This advantage could be overcome by additional help in the application. Since the disadvantage of lack of strength cannot be overcome, it is concluded that the plaster of paris mix is the most practical. This best sample using barium alone with plaster of paris was then equivalent to 1 3/4 mm. of lead. This sample will be spoken of later.

The oxides of lead were now tested in conjunction with the barium, and finally the lead alone with the plaster of paris. It was found that the barium plaster was very much improved by the addition of the red and yellow leads. At first small amounts of red lead and litharge were used, the mix being made up of one part lead, four parts barium and one part plaster of paris. The conditions for the test were made the same as in the preceding case. The samples showed an equivalence of 2 mm. of lead, the red oxide having slightly greater absorption than the yellow. All of these samples were amply strong; it seemed that the substitution of lead strengthened the plaster rather than weakened it as was the case with the portland cement.

Since the lead increased both the strength and the absorption, it was determined to try the lead oxides alone with the plaster of paris. A combination of equal parts of red lead and plaster of paris resulted in the best sample tested, which result might have been expected.

Before too much stress is laid on the quality of this sample of plaster, it must be remembered that this test was carried out with the idea of finding some material to replace metallic lead.

However let us proceed to find the value of this sample and then draw some conclusions as to the desirability of replacing the metallic sheathing by a layer of plaster. Again the red oxide showed a superiority over the yellow. These squares were hard and tough, lacking that brittle qual-

ity so characteristic of many of the samples. To make sure that no experimental error had been made in the comparison of the different mixtures, the four best were radiographed together. The best of the four was the one spoken of immediately above. The two next best were mixtures of lead and barium with plaster of paris. The fourth was the 5 to 1 sample of barium and plaster of paris.

Several further tests were made with the one best sample (equal parts of red lead and plaster paris). Before a satisfactory radiograph could be obtained the voltage was raised to 223,000 volts. In addition to this the distance from the tube to the cassette was reduced to 27 inches which approximately doubled the intensity of the x-rays. (Intensity varies inversely as the square of the distance) The exposure was increased from ten seconds to three minutes. However the current was reduced from 4 ma. to 2 ma. Under these conditions the samples showed an equivalence of between 3 and 3.5 mm. of lead.

The remainder of this report, as far as plaster is concerned, will be devoted to the discussion of the merits, of only two samples; this lead sample (of equal parts or red lead and plaster of paris) and the 5 to 1 barium sample. These two will be referred to as the sample and the barium sample. If some definite conclusions can be reached in the use of these two mixtures, the value of the others may be estimated by comparison.

The barium sample tested 1.75 mm. of lead. To allow a factor of safety for experimental error, unequal distribution of plaster on the wall etc. call this value 1.5. If a wall was plastered on both sides with a 5/8 inch coating, neighboring rooms would be protected by a good 3 mm. of lead equivalent. This thickness is ample for the type of tube used in medical radiography. Plaster of paris can be made to have a very smooth appearance suitable for the wall of any room.

In order to determine the thickness of lead that has been considered sufficient for protection in medical work, the lead glass shield of one of the tubes, a heavy black material 10.5 mm. thick, was tested. It showed an equivalence of 2.5 mm. of lead. Our plaster covering equal to 3 mm. with the shield as a basis of comparison, would be more than enough.

If it was impossible or undesirable on both sides of the wall, the lead sample with an equivalence of more than 3 mm. could be used alone, disregarding for the amount the relative costs.

The room in which the large machine at the Massachusetts Institute of Technology is operated is lined on all walls and ceiling with 1/4 inch of lead which cost $1,600. Knowing the area of this room, the relative costs were calculated.

To coat this same room on the two sides so as to equal the same thickness of lead now on the wall would cost $1,805, or $205 more than the lead itself, if the lead plaster was used. Considering the laths that would have to be applied to the wall to carry the plaster, the cost of applying the protective covering would be as much in one case as in the other. Since a lead covering is so much more durable and is also cheaper, it would be folly to consider plastering a wall with lead plaster, unless some special conditions prevented the use of lead sheathing.

A similiar result was obtained in calculating the cost of the barium plaster. If two sides of the walls were coated with barium plaster of such thickness as to equal 2.5 mm. of lead, the value of the lead glass shield, the cost would be $607. At the same rate of $1,600 for 6 mm. or 1/4 in., this wall of lead would cost $666. In this case the plaster is a little cheaper, but when it is considered that the wall would have to be coated on both sides, and that the plastering does not compare with the lead for durability, the difference in price would not pursuade one to substitute plaster for lead. Since these were the best samples, it follows that none of the plaster samples experimented with, were of practical value.

An attempt to save money by substituting paints and plasters for lead as advocated by certain paint companies, is in vain.

A few tests were also made with lead rubber and lead glass. A piece of lead rubber 5 mm. thick, was equal to 1 1/2 mm. of lead, or equal to a little less than one third of its thickness in lead. From this it may be concluded that the rubber aprons, often used by x-ray operators, would have very slight lead equivalent.

As has been stated, a lead glass shield 10.5 mm. thick had a value of 2.5 mm. when expressed in lead. This glass was then equal to a little less than one fourth of its thickness in lead. Another piece of lead glass having a thickness of 3.8 mm. showed an equivalence of 1/4 to 1/2 mm. of lead, which means that it is worth but 1/10 of its thickness in lead. Considerable discrepancy is seen to exist between the samples.

In one of the tests of glass, an especially thick glass shield mounted on a control panel supposely for the protection of the operator, was radiographed. Although this glass was 3/8 inch thick, it was found to be equivalent to no more than one tenth millimeter of lead. In other words it was a piece of ordinary plate glass. Since this glass was on an instrument made by the well known manufacturer of x-ray apparatus, it would seem not unwise for one working with these rays to make some simple tests to determine the value of their protection.

Conclusion.

In order to protect persons in rooms surrounding one in which an x-ray tube is continually used, the walls must be covered with some material having the ability to absorb all of the rays. Lead sheathing is usually employed for this purpose. However, it is entirely possible to make plasters and cements of not excessive thickness which will equally well provide protection. The materials most practical in making these plasters are lead oxide and barium sulphate, combined with plaster of paris.

While these materials may be applied with facility, the cost of covering a wall with plaster is higher than to cover the same wall with a layer of lead of equal absorbing power.

In no case, it seems, would plaster be more desirable than a covering of lead.

The protection considered sufficient by the medical profession in ordinary surgical radiography is that of 2.5 mm. of lead. This is not always provided on commercial x-ray apparatus, and operators should assure themselves of their protection.

An Unusual Case of Brain Tumor in Which the Roentgen Ray Established the Diagnosis

F. M. DUFFY, M. D.
Second Assistant Physician, Cherokee Hospital,
Cherokee, Iowa

THE patient, H. F., was admitted to the hispital Aug. 18, 1923. The hospital anamesis and examination was made by Dr. F. M. Duffy.

Family History: Father and mother were born in Denmark. There is no history of physical or mental trouble on either parental tree. They have seven children, the youngest of which is the patient under discussion. The remainder of the family are apparently normal.

Personal History: The patient was born Jan. 31, 1899. She had a common school education. She left school at the age of 15 years. She remained at home for two years and following this she became a telephone operator at which occupation she continued until she was 21 years of age. She married Aug. 20, 1921 and has one child now nine months old. When a child the patient had measels mumps and typhoid fever, also yellow jaundice at the age of 4 years.

Menstrual History: The patient's menstrual history began when she was 16 years of age. Her periods have been somewhat irregular, occasionally she has missed a month. She has had little pain at the time of menstruation but the periods usually lasted six or seven days. Sometimes there was much bleeding. She has had no periods since the baby was born, the last period being over a year and one-half ago. She was very ill when the baby was born but was confined to her bed only sixteen days.

Present Illness: This is the first attack of mental trouble and it first made itself manifest during last January. She would not stay at home but would wander from one neighbor's house to another. She neglected her work. She became cross and irritable with her husband. She talks to herself when alone. She imagines that she is considerably "picked-on" by her people. She is careless about keeping herself clean. Of late she has complained of losing her sight and of an inability to swallow. The latter complaint she states has been gradually growing worse for about seven months. She states that she chokes on attempting to swallow liquids. She has been troubled with headaches for the last three years. For the last two or three months she has been loosing considerable weight.

Mental Status: This patient is very well oriented in all three fields. She denies hearing voices or seeing any visions. She answers questions quite well that are within the limits of her education. There is no apparent dissociation of thoughts or ideas. Her memory shows no apparent defects. She does show delusions of a persecutory nature. There is partial impairment of judgement. At times she is irritable and restless.

Observation: As I see this patient, she lies in bed, occasionally rolling about listlessly. She is quite emaciated and undernourished, at this time weighing about 127 pounds. Her hair appears coarse and some what dry. Her bony framework shows no apparent changes. Her pupils rest in dilatation. She is rather drowsy judging from the expression of her face and eyes. As she talks it appears that she has to force herself to do so, talking as does one in a partial comatose state. She appears to be completely fatigued, is exceedingly slow to answer questions but does so correctly and well.

Physical Examination: No cranial scars or deformities are apparent. The ears, nose and mouth are apparently normal. The eyes show no apparent external changes. Ophthalmoscopic examination of the eyes shows the presence of papillodema of both optic discs. The right eye was seen with a minus three diopter lens and the left with a minus two.

Fig. 1.

There is no apparent grandular enlargement on the body. Lung examination shows that the fields expand freely and equally. No positive physical signs were elicited. The heart shows no enlargement and no presence of abnormal sounds nor any irregularities. Her blood pressure shows a systolic of 100 and a distolic of 75. The pulse rate is 60. The abdomen is negative as to rigidity, tenderness or tumor mass and it is not pendulous nor striated. The extremities show no paralysis, scars nor deformities.

Neurological Examination: The eyes react weekly to light accommodation; there is no presence of nystagmus or other irregular movements. The deep sensory reflexes react very slowly. The superficial sensory reflexes are only faintly present. All tests for involvement of the motor mechanism as Babinski, Chaddock, Oppenheim and ankle colonus are negative. In tests for equilibrium we note the Rhomberg sign to be positive. The F. F. and F. N. tests are normal. There are anesthetic areas over the abdomen. There is diffuse paresthesia of the limbs and trunk. Tests for stereognosis were very doubtful.

Laboratory Report: This was made by Dr. Szapannyos, Aug. 20, 1923. The blood presented no abnormal changes. The red cell count was 4,000,000. The blood Wassermann was negative.

The spinal fluid showed:

Pressure .....200 mm.
Noguchi .....negative
Transparency .....clear
Pandy .....negative
Cell count 0
Wasserman reaction
Acetone insol. antigen-negative
Cholesterin antigen-negative
Alcholic antigen-negative
Colloidal gold, negative in all dilutions.

The urine analysis showed:

Quantity ..1100 c. c. in 24 hours
Specific gravity 1.025
Color, gold
Reaction, acid
Albumen, negative
Sugar, negative

No x-ray examination was made at this time.

*Received for publication Aug. 1, 1924.

Diagnosis: After history and physical examination the writer made a tentative diagnosis of tumor in the midbrain. However, laboratory reports were essentially negative. Due to the lack of definite and localized neurological symptoms and findings a staff diagnosis of pychoneusosis of the neurosthenic type was made.

Further Observation and Examination: This was made July 9, 1924. The examination of ward notes from the time of her commitment up to the present time show a gradual increase of the intensity of the above symptoms. An exceptional change which was noted was a more pronounced general weakness of the left side of her body, but no paralysis. I might say that during her entire time under our observation we have never at any time been able to find a definite paralysis in any part of her body. Being interested in the case and continuing to cling to my tentative diagnosis of tumor of the midbrain I sought to make another physical and neurological examination in cooperation with Doctor Fleming, who also expressed the opinion that she thought there was a tumor of the brain. Doctor Fleming gave a history of her having two epileptoid convulsions, one on March 3rd and the other in the early part of July, consequently about July 9th we made further investigation.

Physically she had become greatly emaciated. Her blood pressure at this time showed a systolic pressure of 88 and a diastolic pressure of 78. Average pulse rate was about 70. Otherwise the physical examination showed no further changes than noted previously.

Right eye showed no presence of inflammation or irritation externally. No nystagmus present nor irregularity of movements. Pupil rests in dilatation. Lens is clear; media is also clear. There is a pronounced protruding of the optic cup with a crowding of all the vessels medially. The arteries are small and tortuous. The veins are full and dilated. The optic cup shows much irregularity in its outline. It was possible to examine this only by a minus seven diopter lens. Left eye findings are essentially the same.

Neuroligical Examination: At this writing she is prostrated an unable to move around by herself, however she shows no complete paralysis of any muscles. She is not able to talk above a whisper. She continues to have extreme difficulty in swallowing any kind of food. She has retained control of all her sphincters. Her eyes react weakly to light and accommodation. All superficial and sensory reflexes are present but they are very markedly diminished and slow. There is no difference in their reaction on either side of the body. All tests for motor involvement as Babinski, Chaddock, Oppenmeim, Gordon and ankle-clous are present bilaterally, but more in evidence on the left side than the right. All equilibrium tests show pronounced unstableness. In testing for muscle power we have found muscular strength in all the body muscles to be considerably diminished but there is no inequality in comparing one side of the body with the other. There was very pronounced hyperesthesia and paraesthesia of the extremities. There was anesthesia over the abdomen.

X-ray negatives made of the head presented by enlarged Sella turcica (8 mm.x32 mm.).

Laboratory Report: Made by Doctor Pop, July 23, 1924.

The blood pressure presented no abnormal changes. Red cell count 3,800,000. Blood Wassermann, negative.

Spinal Fluid: Pressure, 240 mm.; Noguchi, doubtful; Pandy, positive; Transparency, clear and yellow in color.

Wassermann Reaction: Acetone insol., antigen-negative; Cholesterin antigen-negative; Alcholic antigen-negative. Collidal gold, 0122100000.

Urine Analysis: Quantity-1200 c. c. in 24 hours; specific gravity, 1.027, color straw yellow. Reaction acid: Albumen negative; Sugar negative.

Diagnosis: Tumor of the midbrain on the basis of the laboratory, history, x-ray and clinical findings.

EDITORIAL

The JOURNAL OF RADIOLOGY

A Journal of Ideas and Ideals.

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A. F. TYLER, M. D.,
Managing Editor

Third Annual Meeting

American College of Radiology and Physiotherapy
November 12, 13, and 14. Hotel Sherman
Chicago.

PROGRAM

THE program for the third annual meeting of the American College of Radiology and Physiotherapy has been completed, but the order of arrangement has not yet been decided upon. Men of prominence in the various phases of physiotherapy and x-ray diagnosis appear upon the program. Only three days will be occupied by the program this year, but one can readily see from the numbers to be given that these three days will be very profitably and busily spent. It is planned to spend two forenoons at clinics in hospitals where efficient x-ray and physical therapy departments are maintained. Men who are teaching the various subjects in the universities intend to cooperate in every way to make the meeting a success.

The following men will deliver their articles, the arrangement of which has not yet been decided upon:

Dr. Roland G. Bruer, Norton Kansas. The Radiographic Diagnosis of Very Early Pulmonary Tuberculosis.

Dr. Miles J. Bruer, Lincoln, Nebr. Autocendensation on the Basal Metabolism.

Dr. Omar T. Cruikshank, Pittsburgh, Penna. High-Frequency Treatment.

Dr. Leo. C. Donnelly, Detroit, Mich. Some Uses of Ultra-Violet Energy in Office Practice.

Dr. Lynne B. Greene, Kansas City, Mo. Ultra-Violet Therapy and Dermatology.

Dr. C. L. Hustead, Falls City, Nebr. Treatment of Thrombo-Angitis-Obliterans of the Head with Diathermy —Case Reports.

Dr. Gustav Kolischer, Chicago, Ill. Theories and Results of the Combination of Diathermy and Radiotherapy.

Dr. G. Betton Massey, Philadelphia, Penna. The Value of Zinc-Mercury Ions in Surgical Tuberculosis.

Dr. R. T. Pettit, Ottawa, Ill. Methods of Measurement of X-ray Dosage.

Dr. Maurice M. Pomeranz, Dr. Herman B. Philips and Dr. Julius Pincus, New York City, N. Y. Gout—A Radiological and Pathological Consideration.

Dr. Curran Pope, Louisville, Ky. Spinal Radiculitis.

Dr. John R. Ranson, Denver, Colo. Radiation Methods in the Treatment of Malignancies.

Dr. B. H. Sherman, Dexter, Ia. Treatment of "Systemic Infection" with the Actinic Ray—Case Reports.

Dr. F. E. Simpson, Chicago, Ill. Cancer of the Tongue and its Treatment by Radium.

Dr. William B. Snow, New York City, N. Y. The General Scope and the Indications for the Static Modalities.

Dr. J. H. Wesley, Newmarket, Ontario, Canada. The X-Ray Treatment of Infective Tonsils and Adenoids.

Dr. David Willmoth, Louisville, Ky. Ultra-Violet Therapy, Its Usefulness to the Surgeon and Gynecologist.

Dr. W. B. Chapman, Joplin, Mo. Ultra-Violet in the Treatment of Pulmonary Tuberculosis.

Dr. B. B. Grover, Colorado Springs, Colo. Maximum and Minimum Results from Autocondensation in High Arterial Tension.

Dr. Walter B. Wallace, and Dr. G. Van Amber Brown, Highland Park, Mich. A Case of Advanced Hypernephroma Treated by Medical Diathermia.

Dr. P. H. Kreuscher, Chicago, Ill. Diathermia, Its Use in Bone and Joint Surgery.

Dr. W. Scott Keyting, Salt Lake City, Utah. Some End Results with Physiotherapy.

Dr. J. O. Parker, Owosso, Mich. Psonasis Treated Roentgenologically.

Dr. Lester Hollender, Pittsburgh, Penna. Skin Malignancies—Diagnosis and Treatment.

Dr. H. W. Grote, Bloomington, Ill. Electricity in Pelvic Diseases of Women.

Dr. A. L. Yocom, Jr., Chariton, Ia. X-Ray and Electrocoagulation in the Treatment of Superficial Malignancies.

Dr. E. C. Henry, Omaha, Nebr. Physiotherapy as an Adjunct to Surgery.

Dr. J. D. Gibson, Denver, Colo. Advances Made in the Treatment of Pulmonary Tuberculosis During the Last Twenty Years.

Dr. Ellis G. Linn, Des Moines, Ia. Diathermy in Non-Supportive Middle Ear Pathology, Preliminary Report.

W. H. B. Aikins, M. D.

The sudden death of Mr. W. H. B. Aikins, lost for the American Radium Society one of its pioneer organizers and Presidents, and for the Canadian medical profession one of its most widely known members. He collapsed very suddenly while at work in his office on Thursday, October 2, 1924, and died immediately. Death was due to angina pectoris. He was in his sixty-sixth year.

Dr. Aikins was born in Richview, Canada, August 22, 1859. After an extensive academic training, he graduated from the University of Toronto, and Victoria University, supplementing his preparation with two years postgraduate work in America and abroad. His licentiate was received in London in 1881 and the examination of the General Medical Council of the United Kingdom in 1883. Until his death he practiced in Toronto.

Dr. Aikins was active in many medical associations which were eventually amalgamated into the Toronto Academy of Medicine, and was Past President of the Academy itself. He was also a member of the medical Congress held in London in 1913. On this continent he was one of the organizers of the American Radium Society of which he was one of the first Presidents. He was a member of the Ontario Medical Association, the Canadian Medical Association, and the British Medical Association, and was a Fellow of the College of Physicians, and also of the Royal Canadian Institute of London, England.

Dr. Aikins was one of the continent's outstanding authorities on the treatment of cancer and the use of radium. He was a pioneer in the field of radium therapy, and had a large quantity of radium constantly at his command. For years he has been looked upon by the medical profession of America as an authority on radium treatment.

Dr. Aikins was one of the outstanding figures in the profession and was a slave to his work. He was a true friend of mankind, and the cheerful open-hearted father to whom the young physician went very often for advice.

He is survived by his widow, a brother and three sisters. The interment occurred Saturday, October 4, in Toronto.

Hospital for Joint Diseases—New York

Announcement has been received of the completion of the new Hospital for Joint Diseases at Madison Avenue, 123rd to 124th Streets, New York City. A cordial invitation was extended to inspect the building and to attend the dedication exercises.

Installation of New X-Ray Diffraction Equipment

CORNELL University and the University of Michigan have ordered complete x-ray diffraction equipments which are to be installed in their physics laboratories. The metallurgical, geological and other departments will also use the outfits. Massachusetts Institute of Technology, Rensselaer Polytechnic Institute, McGill University, Pennsylvania State College, University of Wisconsin, and California Institute of Technology have similiar equipments already in use in their research laboratories.

By means of this apparatus, characteristic x-ray diffraction patterns of fifteen powdered crystals can be recorded photographically at once. The results obtained have an immediate field of usefulness in the theory of metallurgy and in certain branches of physical chemistry, as well as in chemistry and geology. The apparatus is suited not only to general crystal research, but to most forms of routine commercial laboratory work.

International Congress of Radiology

London, 1925.

IT IS suggested that an International Congress of Radiology shall be held in London in the summer of 1925.

The date proposed for the opening is Tuesday, June 30th, the Congress to occupy four days of two sessions each, with subsequent visits to provincial centres.

The house of the British Institute of Radiology will be used as an administrative and social centre for the Congress. It is hoped that an International Committee will be formed by a number of leading Radiologists throughout the world and that the Congress will serve to intiate at the Institute a permanent nucleus for international collaboration of Radiology and kindred subjects.

It will facilitate arrangements if Secretaries of Radiological Societies will announce the proposed meeting in their representative Journals and form organizing committees in each country with a view to sending suggestions for the programme of proceedings for consideration by the Central Committee.

The provisional committee charged with the preliminary arrangements met in London early in September, when replies were received from many Societies interested.

All communications should be addressed to—

The Secretary, International Congress of Radiology,
c/o The British Institute of Radiology,
32 Welbeck Street, London, W. 1.

G. W. C. KAYE, M.A., D.Sc.
ROBERT KNOX, M.D.
STANLEY MELVILLE, M.D.
E. A. OWEN, M.A., D.Sc.
RUSSELL J. REYNOLDS, M.B., B.S.
R. W. A. SALMOND, M.D.
F. SHILLINGTON SCALES, M.A., M.D.
S. GILBERT SCOTT, M.R.C.S. L.R.C.P.
WALTER J. TURRELL, M.A., M.D.
J. E. A. LYNHAM, M.D. M.R.C.P. } Joint
JOHN MUIR, B.Sc., M.B., Ch.B. } Secretaries.

ABSTRACTS and REVIEWS

The Radiographic Appearances of Pseudocoxalgia. C. GUY WHORLOW, British J. Radiol. 29:220-223, June, 1924.

THE author presents a case report accompanied by serial radiographs extending over two years and illustrating the progressive changes that take place in the femur and acetabulum. These changes are revealed as alterations of bony contour and structure.

The head of the femur has a tendency to be mushroom shaped. There is fragmentation of the epiphysis but fusion of the fragmented areas may result.

The neck of the femur may show broadening and give the appearance of coxa vara. The zone of altered calcification is usually ill defined and spongy in appearance. There is a gradual return to normal density.

In the acetabulum there are seen changes in contour secondary to changes in the head. An increase in the clear space of the articulation has been described.

The changes in the head appear before those in the neck, and both advance and recede together. The time taken to produce the changes varies in different cases. The bone changes undoubtedly appear some time before the onset of definite symptoms and moreover they go on progressing after the subsidence of the symptoms. The changes cannot be correlated with different symptoms. The end result is usually a permanently deformed head, no symptoms but slight limitation of abduction. Differential diagnosis lies in distinguishing other conditions in which there is flattening of the head of the femur.

Tuberculous osteomyelitis of the neck may have to be excluded. In this disease the rarefaction of bone is more uniform. The bone presents a general haziness. The rarefaction is walled off by a zone of condensation. The pattern formation is absent.

Separations from the Capitulum Humeri as the Most Frequent Determining Cause of Arthritis Deformans Cubiti. H. J. PANNER, Acta Radiologica, 3:129-151, June, 1924.

THE very common arthritis deformans, the author believes, is most frequently due to the so-called osteochrondritis dissecans of the capitullum humeri. Except in rare instances the affection begins between the ages of 12 and 20 years, perhaps most frequently between the ages of 15 and 18.

The origin of the affection is always traumatic, though not in the sense that it can in every instance be traced to some definite trauma. The small everyday traumata—particularly the forced extension of the elbow—are the chief causative factors. The affection occurs therefore most frequently in male apprentices of the artisan and agricultural classes, and by far most frequently in the right elbow. However, its occurrence in the left elbow is not rare and often the occurrence is bilateral. It is far more rare in females. If there is any individual disposition it is of an unknown nature.

The trauma produces a subchondral lesion, and in most cases a fissure in the cartilage of the capitulum humeri, probably this fissure often goes into the bone. In rare cases the lesion heals with resultant complete restitution. Sometimes the cartilage will remain fissured for a considerable length of time, perhaps for years, but in most cases a cartilagenous or osteocartilagenous fragment becomes separated which, as a rule, will continue to exist as a corpus liberum and in course of time it undergoes secondary changes such as calcification, ossification or growth. In rare cases this corpus liberum can probably become resorbed following coalescence with the capsular ligament, in the same manner as has been frequently observed in experiments on animals. But whether a fragment has become separated or not, conditions have undoubtedly been created for the onset of an arthritis deformans which may subsequently assume more or less serious proportions.

In the early stages of the affection the symptoms are very slight as a rule and consist merely in a reduced power of motion particularly as regards extension. Frequently the affection is overlooked for a long time and is discovered only accidentally or as the result of an aggravation due to some new trauma. In rare instances it can be characterized even in early stages by corpora libera. In the later stages there are all the symptoms of arthritis deformans although contrast between the slight symptoms and the great deformity is remarkable oftentimes.

The roentgen examination gives typical pictures of the affection in all its stages. At first there are only rarefactions in the capitullum humeri, later there are shadows of corpora libera and deformities. The deformities are most strongly pronounced in the head of the radius. Even in the gravest cases of arthritis it is possible to ascertain the point of origin of the affection either through structural changes in the capitullum humeri or by flattening of its distal contour. In a number of cases, however, the seat of the original lesion will undergo such complete restitution that no trace of anything abnormal will appear in the picture.

Considering that the separated fragments consist mainly of cartilage and that any persistent fissure also includes chiefly the same substance, the rarefactions in the capitullum humeri are remarkably distinct, a contrast which may perhaps be explained by the occurrence of secondary changes in the immediate neighborhood of the original lesion, involving necrosis and absorption of osseous tissue.

In its early stages the affection will most frequently be diagnosed tuberculosis, but the symptoms are remarkably slight. In every case its true nature can probably be determined by roentgen examination.

Prognosis depends upon proper treatment being introduced at the proper time. If a well developed arthritis deformans already exists prognosis is doubtful and operation can be only palliative at best.

Roentgenological and Experimental Studies on the Pathogenesis of the Dyschondroplasia (Ollier's Disease). P. G. K. BENTZON, M. D., Acta Radiologica, 3:89-11, June, 1924.

THE author regards Ollier's disease as a neurotrophic disorder of the bony tissue owing to anomalies in the innervation of the vessels of the bones. This view of the subject is chiefly based upon the following facts: (1) The disease is very often confined to one-half of the body. (2) The pathological changes in the bony tissue, viz., the masses of hyaline cartilage, are found to follow paths similar to those of the arteries of the bones. (3) By interrupting the

nerves to the vessels in animals (rabbits) the author has in some cases been able to produce changes in the bony tissue resembling the structural changes seen in Ollier's disease.

The pathological processes in the bony tissue may be assumed to be related to the phenomena seen in the formation of callus.

Electrocoagulation Methods in the Treatment of Hemorrhoids: A Simple Bloodless Technique. J. B. H. WARING, M. D., Virginia Med. Monthly, 51:235-238, July, 1924.

PHYSIOTHERAPY is rapidly coming into its own and the progessive doctor is realizing this. One should forget the source and study the method when he finds that an unrecognized method practiced by an "irregular" is seemingly producing results that the regular physician does not get. Nor should one be too superficial in his investigation of these new things. If family physicians and surgeons would make this a practice their patients would not be so ready to support the quack.

For the average case of hemorrhoids the usual surgical methods are *passe*. The author is having constantly pleasing results from electrical treatment of such cases and he presents the technique, not in every minute detail, but in a general way as follows:

"Operation is performed under local anaesthesia. About three quarters of an hour prior to operation, morphine sulphate, grains ¼ to 1/3, is given by mouth, together with atrophine sulphate, grains 1/100, and strychnin sulphate, grains 1/30. This may be given by hypo if desired.

"Bowels should have been emptied prior to operation, preferably by a simple enema or glycerin suppository. Operative field is now cleansed with mild soap and water, followed by irrigation with a weak potassium permaganate solution, say 1 to 3,000 or 1 to 5,000; this largely eliminates fecal odor for the time being and renders the field more satisfactory to work in.

"An appropriate spot of rectal mucosa is swabbed with 10 per cent cocaine and through this preliminary anesthetized area, the entire field is successively anesthetized in a practically painless manner by successive injections of 1 to 2 per cent novocain solution. If a glass suction cup of sufficient size to cover the anus is now applied, internal piles will be drawn down and temporarily converted into interno-external piles; likewise all pile masses will be congested and made prominent to inspection, so that the operator is not so likely to miss a budding pile or two, and have his patient return in six months after operation. . . . Individual pile masses may now be taken up one by one and held in the grasp of an appropriate sized suction tube of glass; or they may be drawn out with the seizing forceps and held across their base with a regular pile clamp. . . . . The suction tube holds the hemorrhoid out prominently and serves the purpose of a steadying forceps without the crushing and lacerating effect of a pile clamp.

"An electro-coagulation needle in an insulated handle is now brought into play using the bipolar d'Arsonval high frequency electric current directly on the pile mass. The indifferent electrode, usually about a five or six inch plate of a diathermy metal, is strapped over one leg or over the shoulder or abdomen, care being taken to have good contact by means of a cloth wrung out of saline, damp felt or special electrode metal with soap suds for better contact or the patient may grasp the regular autocondensation handle instead.

"The electrocoagulation needle in an insulated handle is now connected by flexible insulated wiring to the active pole, and the needle carried through the base of hemorrhoid under edges of suction tube holding pile out prominently. With footswitch just enough current is sent through the needle to coagulate but not to carbonize or burn hemorrhoidal tissue; this process is repeated with several injections of the needle until a layer of tissue at base of pile proper is entirely coagulated, thus destroying blood and lymphatic supply to the pile proper. A little experience will quickly determine for the operator just the right amount of current to employ.

"If there are, as is usually the case, several pile masses to be removed, each successive pile is taken up and treated in the same manner: only a few minutes is required for the entire procedure. If care is taken to handle the pile masses gently, and proper anesthesia is obtained, the entire operation is painless. The tissues at base of each pile are simply coagulated in a manner similar to the poaching of an egg. Pain following the operation would be indicative of sparking and some degree of carbonization on the active electrode, which is to be avoided.

". . . Coagulation of its base destroys blood and lymphatic supply of the pile mass and in a few days this sloughs off in a painless and bloodless manner, the skin and rectal mucosa involved healing over the operated area very rapidly. . . . . The treatment is admirably an office procedure, ... Nervous or weakly patients are instructed to take it easy for a day or two. . . . . We do not have to make any radical change in the patient's dietary, but instruct him to eat a trifle less for a few days until full activity is restored. Liquid petroleum, or preferably petrolagar, in full dosage for a few days is very helpful in rendering the bowel passages bland and easy; our patients do not dread the first bowel passage after operation . . . . . the bowels move the next morning as usual . . . . some mild soothing ointment is applied to the anal region from day to day for a few days . . . . . the patient is free to go about his usual vocation."

A number of case reports are submitted.

Positive Galvanism for the Treatment of Hemorrhoids. H. W. SIGMOND, M. D., Service Suggestions, Victor X-Ray Corporation.

THIS article gives specific technique for this treatment The Victor X-Ray Corporation, Jackson Blvd. at Robey St., Chicago, will gladly supply a copy of the article free to any who have not seen it.

Electrothermic Methods in the Treatment of Neoplasms and other Lessons. WILLIAM L. CLARK, M. D., J. DOUGLAS MORGAN, M. D., and EUGENE J. ASNIS, M. D. Therapeutic Gazette, 49:462-474, July 15, 1924.

THIS paper comes from the Clinical and Research departments of the William L. Clark Hospital, Philadelphia.

Operative surgery, electrothermic methods, radium and x-rays are all employed at this institution and an experience of many years has convinced the authors of the extreme importance of electrothermic methods. The prejudice against these methods is due to the fact that they have been many times ignorantly misapplied. Equipment must be efficient and properly selected, technique must be proper, and to intelligently use these methods requires a precise knowledge of anatomical landmarks and the same surgical judgment that every good operator must have. Capable surgeons sometimes condemn electrotherapy but in nearly every case it can be proven that technique and not electrotherapy is at fault. The authors mention an article which appeared in the Journal of the A. M. A. condemning electrocoagulation in the treatment of surgical tonsils. In this particular case failure was due to using the method on infected tonsils, a thing which should never be done.

Fulguration, thermocautery, galvanocautery and electrolysis are entirely dissimilar and inferior to the methods under discussion. High frequency currents produce two definite tissue changes, namely *desiccation* and *coagulation*. Desiccation and coagulation methods are not the same thing. This is proven both clinically and histologically. The Oudin current by which desiccation is produced is of relatively high voltage and low amperage; the d'Arsonval current by which coagulation is produced is of lower voltage and higher amperage and the effects produced are entirely different.

By the desiccation method just enough heat is utilized to desiccate or dehydrate the tissue, the heat being produced by a monopolar high frequency current, Oudin type. A single spark gap is employed in the circuit. A milliamperemeter cannot be used to measure a monopolar current. The proper current strength necessary to destroy growths of different types and sizes can be learned only through experience. The method is subject to perfect control.

Desiccation is used for benign or malignant growths of small or moderate size. It is used when the lesion is localized and when good cosmetic results are essential. Conditions successfully treated by desiccation are localized benign growths of the larynx, bladder or rectum, corneal ulcers, pterygium and trachoma and minor gynecological lesions. Moles, papillomata angiomata, nevus pigmentosis, leukoplakia, lupus vulgaris and erythematosis are also successfully treated. Malignant lesions of the skin and mucous membrane, hemorrhoids and infected tonsils are included in the list. The milder desiccation method may be used on surgical tonsils where electrocoagulation would fail.

Coagulation is produced by a bipolar high frequency current of the d'Arsonval type, utilizing a multiple spark gap. It is more penetrating and intense than the disiccation method and in accessible locations is utilized to destroy larger growths, even those involving bone. There are many variations in technique to suit the individual case and these have to be learned by experience. The general points of technique are given.

Whether desiccation or coagulation is the method employed, the aim should be to destroy the growth at a single operation and diseased tissue should as a rule be immediately removed by excision or curettage after which the base may receive further treatment. When mucous surfaces are involved it is better to allow the destroyed tissue to slowly separate.

In dealing with localized, benign or malignant tissues the superiority of electrothermic methods over radiation treatments is shown by definite histological changes and by a comparison of clinical results. Radiation treatment should not be used in conjunction with electrothermic methods in localized, benign or malignant lesions. There are many cases in which the electrothermic methods are not applicable and where radiation treatment is preferable. Only in localized tumors of a nonmetastasizing type should electrotherapy be used alone. There are some cases however, where judicious combination of electrotherapy, radium and x-rays is desirable. Just as it is irrational to expect success by surgical excision of a cancerous growth in a series of operations, so is it irrational to expect to successfully treat a malignant growth by a series of desiccation or coagulation treatments. One radical treatment should be the aim. Clinically summarized, the aim of electrothermic methods is to destroy malignant cells, to seal blood vessels and to obtain a healing wound with the least amount of cicatrization.

Desiccation produces less fibrous tissue than does coagulation.

Diathermy in Internal Medicine. EDWARD W. JACKSON, M. D., Jour. A. M. A., 83:266-269, July 26, 1924.

THE proper application of diathermy requires proper technique, good judgment and a broad general knowledge of medicine. One cannot expect satisfactory results without these nor can one expect good results from a single treatment or from scattered treatments.

In all, the author has given 1,470 treatments to 61 patients but he reports in this paper only cases of arterial hypertension and precordial pains including angina pectoris. Angina pectoris is sometimes given as the diagnosis when neuralgia or myalgia of the chest wall is the cause of the pain. This is a conclusion reached after ten years of a practice devoted largely to cardiovascular disease.

A review of the literature on arterial hypertension reveals various opinions on the value of diathermy in arterial hypertension but there is ample testimony to the fact that many practitioners are finding it of value in such cases.

The author presents 13 case reports of patients treated for a period of three years with good results. The d'Arsonval current was used for from one-half to one hour from one to five times per week. Too prolonged treatment with high milliamperage is weakening to such patients and it is also almost necessary that patients should lie at rest for several hours after each treatment. Rest, diet and hygiene are important factors in treatment. It must also be kept in mind that there is a minimum pressure to which any given case of compensatory hypertension can be reduced without symptoms and signs of circulatory failure becoming apparent. A few weeks of intelligent treatment will discover this optimum level. The same effect can be secured from sedative baths combined with diet, rest and hygienic treatment as from diathermy.

The author has found diathermy of very definite value in angina pectoris and in neuralgia and myalgia of the chest walls. He reports several such cases.

The Ophthalmologist, Roentgenologist and Serologist Indispensable to the Syphilologist. J. Iowa State Med. Soc. 14:311-316, July, 1924.

IN THE diagnosis of syphilis the opthalmologist, the roentgenologist and the serologist are indispensable. Many times the former two will diagnose syphilis when the laboratory test has failed. A careful eye examination of bone or viscera often reveals unsuspected syphilis. Many times the roentgenologist will differentiate a syphilitic process of the bone from sarcoma, giant cell sarcoma, bone cyst, tuberculosis, rickets, and injuries. Many cases which would once have been diagnosed as tuberculosis of the lung are now diagnosed as syphilitic.

The Roentgen Ray Treatment of Keloids. HENRY H. HAZEN, M. D., Am. J. Roentgenol. 11:547-548, June, 1924.

THE vast majority of keloids can be successfully treated by the roentgen ray. The chief risk is that telangiectasia may develop. Small, hard lesions and lesions occurring upon the face are extremely difficult to manage. Large lesions should probably be excised and irradiation be begun immediately after operation. Keloids in the negro are much more difficult to treat than in the white.

The author reports 16 cases of keloid treated in his practice (a total of 35 lesions), with good results in 27 of the lesions.

Deep Roentgen and Radium Therapy in Carcinoma of the Tonsil. G. W.

GRIER, M. D., Am. J. Roentgenol. 11:537-542, June, 1924.

THE authors found in their early experience that the use of the roentgen ray alone, directed into the mouth through a speculum, and external roentgen ray treatment of the glands, was ineffectual. Applying radium directly against the primary lesion and treating the neck from without by means of roentgen rays was next tried. This method is effective with a primary lesion providing the radium can be kept in contact with the lesion for a long enough time. The next step was to use radium needles instead of radium applied to the surface, which increases the probability of the complete destruction of the lesion.

Metastases in the neck have been treated by ordinary roentgen ray methods alone or following surgical removal; by radium applied externally and also in the wound following surgical removal; by deep therapy both before and after surgical removal. The best results have followed deep therapy over the glands of the neck before anything else was done, this followed by the use of radium on the primary lesion.

The authors have treated six cases by means of needles introduced into the tissues. In five of these the primary lesion has healed completely, the sixth case is not doing well. If radium element is used instead of emanation, care should be exercised not to overdose, as extensive sloughing may follow and be disastrous. Nine hours is given as the maximum time that 10 mgm. needles should be left buried in the tonsil. The author has had no experience with radium emanation in these cases.

The treatment of metastatic glands in the neck presents more difficulties than does the treatment of the primary lesion. The author believes the following technique is the best:

"When first seen the cervical region on the affected side should be treated by the high voltage method, a dose being given that will produce a well defined erythema. The exact factors used will vary with different installations, but the point is that a definite erythema dose should be given over the whole affected side before anything else is done. The factors . . . . are 20 inch skin focus distance, 200 kv., 4.5 ma., 0.5 mm. Cu and 1 mm. Al filters, area 4 inches square, time 90 min. . . . . After about three days the primary lesion should be treated by introducing radium needles or emanation tubes into and around the lesion. This may be done with either a local or general anesthetic, depending on the skill of the operator. . . . . If 10 mgm. needles are to be used . . . . . they should be placed about one centimeter apart and left from seven to nine hours. . . . . It requires about six weeks for the primary lesion to heal, and during this time the patient will suffer considerably from pain. Narcotics may be necessary from time to time and a mild antiseptic mouth wash should be used. At the end of about six weeks the deep therapy treatment should be repeated whether there are any visible signs of the disease or not; and I believe that a third or fourth treatment at intervals of two months is a wise precaution."

Case reports are submitted.

Malignant Growths of the Paranasal Sinuses Treated by Irradiation, Electrocoagulation and Other Methods. ROLLIN H. STEVENS, M. D., Am. J. Roentgenol. 11:532-536, June, 1924.

THE author believes that in cases presenting a definite diagnosis of sarcoma no piece of the growth should be removed for microscopic examination, but if deemed advisable it should be removed with the assistance of electrocoagulation, followed immediately by proper deep therapy, giving as nearly homogeneous irradiation as possible.

In all other cases, after a painstaking effort to make a clinical diagnosis, a section can be taken for microscopical examination if the wound is closed by electrocoagulation, followed immediately by careful irradiation. Operation by electrocoagulation should soon follow if it is possible to use this method in the region concerned.

Recurrences should also be electrocoagulated and probably treated with radium. Cases with adenopathy or metastases are probably hopeless, and should be accepted only with the distinct understanding that such treatment is probably only palliative.

Devitalization of bone is to be expected in these cases where electrocoagulation is used. This may also follow heavy radiation with either radium or the roentgen ray. This bone can be easily removed a few weeks or months later.

Value of Radiation Therapy in Ophthalmology. SANFORD WITHERS, M. D. Am. J. Ophthal. 7:514-521 July, 1924.

THERE are five structural characters which determine susceptibility to radiation, namely: (1) undifferentiated form of cells; (2) rapid growth with abundance of mitosis; (3) large, hyperchromatic nuclei (4) vascularity, especially when due to an abundance of thin walled capillaries; (5) absence of stroma or intercellular substance.

The conditions for which treatment by radium is considered the method of choice by the author are: (1) basal cell carcinoma; (2) epithelioma of the cornea, corneoscleral juncture; (3) undifferentiated sarcomas, including gliomas, lymphosarcoma and giant cell sarcoma of the orbit; (4) myeloid and lymphoid deposits including chloroma and Hodgkin's disease; (5) angiomas including hemangiomas, cirsoid aneurysms, port wine stains, vascular nevi, lymphangiomas and lymphangioma tuberosum multiplex; (6) spring catarrh (vernal conjunctivitis).

The conditions in which radium is of proved value but not necessarily the method of choice are given as: (adenoid cystic carcinomas of the salivary type arising in the skin and lacrymal glands; (2) prickle cell carcinomas; (3) sarcomas and melanomas of differentiated cell structure (includes fibrosarcoma, adenosarcoma, but not chondromas nor osteomas); (4) actinomycosis and blastomycosis; (5) lupus vulgaris and lupus erythematosus.

Conditions in which radium may be used where more traumatizing procedures are contra-indicated are named as: (1) cataract; (2) pterygium; (3) nevus papilloma, xanthelasma; (4) cicatrices (scar contractures) and keloids; (5) trachoma and its complications, panus and cicatricial scarring.

Conditions in which experimental applications of radium are justified because of favorable results in pathologically similar conditions in other locations or because of definite evidence of radiosensitiveness of the particular cells involved are: (1) phlyctenular conjunctivitis (tuberculosis of the cornea of conjunctive) and phlyctenular keratitis; (2) keratoconus; (3) chronic dacryocystitis; (4) metastatic growths; (5) palliation; (6) blepharitis.

Conditions under which radium may be used as a prophylactic measure are given as: (1) intraocular melanomas and gliomas with radical enenteration of the orbit and bulky malignacies which cannot be destroyed completely by surgery; (2) (palliation), hopeless malignancies.

Specific directions for technique are not given but all of the above conditions are discussed with relation to treatment and the technique is included to some extent.

Stereoscopic Examination. CLARENCE O. SIMPSON, International Journal of Orthodontia, Oral Surgery and Radiography, 10:437-441, July, 1924.

REFERENCES to the subject of stereoscopic intraoral examinations usually exaggerate the difficulty of the method. The fact is, says this author, that a stereoscopic examination is the same as any other two exposures of a region except for the fact that the tube target is shifted 65 mm. and the patient must not move between exposures. Confusing instructions are often given for viewing; all that is necessary is to hold the films in the same plane before a hand stereoscope and move them until the images fuse and a stereoscopic view is obtained of the lingual or facial aspect depending upon the right or left relation of the films. Careful and precise technique is requisite for these films as for all oral radiography but there is no great mystery nor difficulty according to this author.

What the Practitioner Should Expect in X-Ray Diagnosis. F. B. STEPHENSON, M. D., Colorado Med. 21: 222-227, August, 1924.

THE author discusses diagnosis in the regions of the head, abdomen, chest, digestive tract, urinary tract, bone conditions and the eye. He concludes by saying that one can expect cartilage to show as such, nor agnosis except an unqualified diagnosis of early brain tumors, character of pelvic tumors and diagnosis of diseases which show no major organic change although acute chest conditions give distinguishing shadows. He warns the general practitioner not to expect cartilege to show as such, nor ruptured ligaments, nor nerves. Nor should he expect a differential diagnosis between a large empyema and hydrothorax nor a diagnosis of pregnancy under three months, nor that gall-bladder pathology shall be demonstrated in every case of its occurrence. Nerve tissue is more resistant to x-rays than is any other tissue, therefore there is not great danger of damage to either the retina or the optic nerves in simple diagnosis.

Radiography and Obstetrics. M. J. AUSTRALIA, No. 23: 571-572, June 7, 1924.

THIS is an editorial urging obstetricians to make greater use of the x-ray in prenatal care. Unruptured extra-urine gestation can be diagnosed, twin pregnancy can be differentiated from hyramnios, pregnancy from myomata and a hydrocephalic head can be recognized and suitable treatment inaugurated. Much useful information regarding the maternal pelvis can also be obtained. Old fractures and diseased joints are brought into prominence and gross contractures of the cavity of the bony pelvis are immediately apparent. Radiographic methods are useful in pelvimetric estimations and MacKenzie's article upon this subject is referred to. An abstract of MacKenzie's article appears in the current June issue of the Journal, page 215.

Expeditious, Accurate Roentgen Ray Method of Determining Seventh Cervical Vertebra. WILLIAM J. MANNING, M. D., Jour. A. M. A. 83: 192-193, July 19, 1924.

IT IS often convenient to have the position of the seventh cervical vertebra marked in such a way that a lesion near any particular vertebra can be accurately and quickly located by reference to the marked seventh vertebra. The method of marking is simple. The head of the patient is raised from the table, if he is supine, until the "vertebra prominens" is clearly manifested, the head being held in this position long enough to permit a length of wire long enough to project outward on each side to cover the full width of the body; or a short strip of wire may be laid over the spinous process in a parallel or horizontal manner. The wire is then secured by adhesive tape. Another method is to use liquid pigment to mark the same prominent process, then raise the presenting surface of the cassette, film container or plate-containing envelope and mark thereon the impression received from the pigmented prominent vertebra. The two marked points are afterwards brought opposite each other in adjusting the patient into the proper position on the table. The wire marker is then laid over the marked point on the cassette or plate holder and the exposure is made. The device is very useful in demonstrating cases before juries as well as being useful in practice.

Relation of Roentgenology to the General Practitioner. C. HARVEY JEWETT, M. D., Clifton Medical Bulletin, 10: 53-56, June, 1924.

THIS is a survey of the x-ray's field in diagnosis; not technique nor interpretation of films but a catalogue of what the x-ray may reasonably be supposed to accomplish in each diagnostic field is the theme.

Coolidge Tube Quantitative Variations. GEORGE M. MACKEE, M. D., and GEORGE C. ANDREWS, M. D., Am. J. Roentgenol. 11:525-532, June, 1924.

IONIZATION experiments with an inontoquantimeter show considerable variation of energy output from different Coolidge tubes. Experiments on the skin show a variation of output from different Coolidge tubes, although, judging from visible skin effects alone, the difference is not great. A difference of energy output amounting to 57.8 per cent (as estimated by ionization) causes very little difference in the visible cutaneous reaction. The manufacturer is urged to classify therapeutic tubes according to ionization estimation of energy output. The indirect technique used by dematologists in this country is the most accurate yet devised, and it is sufficiently reliable for practical purposes.

Fire Hazard and Safety. M. B. HODGSON, Am. J. Roentgenol. 11:557-560, June, 1924.

THE roentgen ray films manufactured on a cellular acetate support are not so likely to cause spontaneous combustion as are the older cellulose nitrate films but as the former are more expensive the more inflammable cellulose nitrate films are more commonly in use. The danger from fire has been rather overestimated this author thinks as it is only when films are stored in huge quantities that the danger becomes threatening. Roentgen ray films are not as likely to burn as are movie films but where they are stored in any quantity the following precautions are recommended:

(These suggestions are not intended to be construed to apply to films in establishments where the general considerations of use and environment are substantially different from those in hospitals and they have not yet been approved by the National Fire Protection Association but it is believed that they closely approximate the requirements which that organization will make).

Smoking should be prohibited in all rooms where films are stocked, handled or filed. A metal can should be provided for all waste negatives and film scrap and at no time should these be allowed to accumulate in any place. It is best to keep the stock of unexposed films at a minimum. Stock should be kept in a metal container in a cool, dry place out of the way of ordinary room traffic. In rooms where films are filed or handled there should be no flames nor any lighting other than standard electric fixtures. Open lamp bulbs should have guards. A hand fire extinguisher should be kept in each room where

films are handled and darkroom and other doors should be arranged so that egress is easy. Film negatives should be filed as soon as possible in heavy manila envelopes, and useless negatives weeded out from time to time. No other inflammable materials should be stored where these films are and no litter or waste accumulation of paper should be allowed. Illuminators should be so designed that the diffusing glass is not too hot to touch and there should be no unnecessary display of film negatives in lighted illuminators. When it is found necessary to keep an active file of films for a current period of about a week these should be kept in a metal container and such a file should be limited to fifty pounds weight. Films should never be stored in the basement of any establishment.

The above suggestions are general suggestions. Suggestions for filing bulk stock of film negatives follow:

The room for such a purpose should be of fire resistive construction and must have a direct outlet to the outside air. There should be a Class B, self closing fire door at communication to building proper and the room should be additionally protected by automatic sprinkler heads operated from an adequate water supply.

The vent for the open air may be kept covered from the weather by metal or glass but if such a protective device is used it should be hinged so as to open automatically in case of fire. The exact size of the vent depends upon the number of pounds of negative stored. For 1,000 lbs., there should be a circular opening 13.5 inches in diameter; for 500 lbs. 9.5 inches; for 250 lbs., 6.75 inches. The weight of 1,000 negatives 14x17 size is about 118 lbs.; 10x12 about 60 lbs.; 8x10 about 40 lbs.

In case such a room is not available the next best thing is the use of proper metal cabinets if the quality of films does not exceed a reasonable amount. If more than 250 lbs. of films are stored in such a safe it should have double compartments and each compartment should be separately vented. The sprinkler protected safe is the best.

These suggestions have been carried out by a number of users of roentgen ray films and have been found adequate by underwriters. The attendant cost has not been excessive.

In connection with this abstract it is interesting to note that the Victor X-Ray Corporation has just announced a new safety film, more expensive than the ordinary film but said to be fire proof.

Experimental Studies in Roentgen Ray Effects. JAMES B. MURPHY, M. D., Am. J. Roentgenol, 11:544-546, June, 1924.

THIS report comes from the Rockefeller Institute for Medical Research.

Autografts from spontaneous cancer of mice, when replanted in an area of skin previously exposed to an erythema dose of roentgen ray failed to grow in the majority of instances while similar grafts inoculated into an untreated area grew in a large proportion of animals. Autografts of spontaneous cancer established and growing in the skin, disappeared in 76 per cent of the mice after the tumor and surrounding skin had been exposed to an erythema dose of roentgen ray, while other autografts of similar derivation which had been given a like dose of roentgen ray outside of the body and had been replaced in the same animal grew progressively in 96 per cent of the fifty This result was proved not due to a greater susceptibility of the cancer cells treated with roentgen rays in situ.

Principles established by animal experimentation may not apply to man, it is true, but in the experiments reported here the authors have dealt with the natural disease and as far as can be determined spontaneous cancer in mice does not essentially differ from that in man. Whether or not the mouse responds to roentgen ray treatment in a different way than does man remains to be seen.

"Unquestionably the present method of treatment is based on the idea that the roentgen ray has a more or less selective action on cancer tissue. If it is proved that this idea is incorrect and that the roentgen ray exerts its effect in man, as in mice, by creating an unsuitable environment for the survival and growth of cancer, it should be possible to put roentgen ray therapy on a rational basis with the probability that it can be developed into a more effective form of treatment than it is at the present time."

Preliminary Note on Observations Made on Physical Condition of Persons Engaged in Measuring Radium Preparations. R. C. WILLIAMS, M. D., United States Public Health Reports, 38:3007-3028, Dec. 21, 1923.

THIS report presents the observations made and the conclusions reached in a study made in the radium section of the United States Bureau of Standards at Washington, D. C., where practically all the radium that is sold for medical or other scientific purposes is first measured. Observations covered a period of a year and a half, and conclusions and recommendations are thus given:

At least two persons, one an employee at the time of the study and one a former employee, presented symptoms showing evidence of the effect of radium upon the skin of the fingers and hands. Observation showed that employees were exposed to radiation as evidenced by positive effects upon dental films worn by them in their routine work. Certain blood changes were noted, notably a tendency of the polymorphonuclear neutrophiles to remain slightly below the lower normal limit, and a diminution in the small lymphocytes while the large lymphocytes apparently ran somewhat higher than normal. The total white cells had a tendency to decrease in number as well as the total red cells. A low blood pressure as compared with the usually accepted normal was noted in practically all employees.

As a result of these investigations it was recommended that blood examinations and blood pressure readings be made at regular intervals on all employees of the radium section and that complete physical examination be made of employees at regular intervals; also that all new employees be given a complete physical and blood examination before entering upon service. In addition it was recommended that employees utilize to the greatest possible extent all practicable protective devices, such as screens, lead-lined carrier boxes and forceps and that they be warned to reduce to the minimum the amount of unavoidable unprotected exposure to radiation and not to remain in the vicinity of radium any longer than absolutely necessary.

Thorough ventilation of all rooms in which radium was handled was recommended, the use of electric fans being advised. In packing and unpacking the radium, wrappings should be assembled, arranged and prepared so as to expedite the time of exposure to radium.

It was further recommended that all employees be permitted to work only five days a week and that the two holidays be taken consecutively and not considered as annual or sick leave. Furthermore that all employees be required to take thirty days annual leave, in two week periods at six months interval if at all practicable to do this.

Notes on An Opaque X-Ray Mass. EBEN C. HILL, Johns Hopkins Hosp. Bull. 35:218-221, July, 1924.

THIS is a preliminary report upon an opaque x-ray injection mass, readily prepared and giving sharp outlines of the arteries and arterioles and yet one which cannot pass into the capillaries. This mass is for postmortem injections and is made up of 15 to 18 grams of bismuth oxychloride, 5 to 10 grams of acacia, and water sufficient to make 100 c.c. By repeated semifiltering the mass may be reduced to a suspension of bismuth containing particles of from four to eight microns and thus pass through the capillaries.

The high atomic weight of bismuth requires small quantities of this metal to produce definite shadow effects. To determine whether the injections are complete the anterior ciliary vessels of the eye and a subdermal cut in the toe or finger are the most valuable criteria. It is impossible to obtain perfect results if rigor mortis has begun or if blood clots are present in the vessels. Injections with this bismuth mass may be cleared by the usual Schultz or Spalteholz method.

A Study of the Immediate Effects of X-Rays on the Functions of Certain Tissues and Organs. M. B. R. SWANN. British J. Radiol. 29:195-219, June, 1924.

X-RAYS cause a gradual and regular lowering of the mean blood pressure in intact animals and if exposure be prolonged death occurs from cardiac failure. The fall of blood pressure may be due in the early stages to a dilatation of arterioles and capillaries. However, an adequate explanation of the fall in blood pressure is not yet forthcoming.

Respiration is stimulated by short exposures and depressed by longer ones, the final respiratory effect resembling that produced by morphine. The stimulation of respiration is probably not produced by an excitation of the center in the medulla but by increased reflexes from the sensory nerve endings of the body. Constriction of the bronchial muscles has been shown to occur as the result of exposure to x-rays.

The autonomic nerves (vagus, sympathetic and splachnic) are rendered more sensitive by short exposures and may be depressed by prolonged exposures.

X-rays cause the isolated rabbit's heart to die in systole. In the isolated rabbit's heart, short exposures increase the degree of contraction, and occasionally diastole is also lengthened. Prolonged exposures dilate the coronary vessels and cause the ventricle to enter into tonic contraction.

The isolated uterus of the virgin guinea pig is, after a latent period, driven into tonic contraction. Subsequently periods of toxic contraction alternate with periods of large automatic movements. Provided no further exposure to the rays be given, the uterus returns to apparently normal condition. For recording the movements of the uterus and intestine in the intact animal a new method was devised, using a liquid paraffin manometer. X-rays cause the uterus in the intact animal to enter into a series of very large contractions, but the latent period is longer than for the isolated guinea pig uterus, and the onset of the contractions less sudden. There is also a rise in mean tone. It is not for some hours after switching off the rays that the tone of the uterine muscle and the size of the contractions approach more nearly to the normal condition.

X-rays cause the tone of the isolated rabbit's intestines to rise steadily to an excessive degree. The effect resembles that produced on plain muscle by drugs such as lead or barium. In intact cats and rabbits, x-rays produced an increase of the intestinal movements and a slight rise in tone. In the cat the rise in tone may be great. After turning off the rays there is a gradual diminution of tone. It is not yet possible to say whether the action of x-rays is directly upon plain muscle or upon the autonomic nerve endings in the muscle.

The Effect of Ultraviolet, X-Ray and Radium Emanation on the Toxicity of Normal Blood. DAVID I. MACHT and EBEN C. HILL. Jour. Gen. Physiol. 6:671-676, July, 1924.

THIS article gives an account of interesting experiments to determine the effect of these agents on the toxicity of normal blood. Normal difibrinated blood (pig, ox, human) was kept from coagulation by the use of heparin and was rayed by these three agents. A small quantity of the rayed blood was added to a perfect nutrient medium containing various salts necessary for the growth of plants. Seedlings of Lupinus albus were used. Comparison of the seedlings grown in the toxic solution with those grown in the pure solution showed that growth was definitely influenced by various radiations. It was found that ultraviolet rays produced no effect on normal blood except to render it slightly less toxic. Roentgen rays rendered the blood more toxic and the effect of radium emanation was about the same as that of roentgen radiation. The toxicity is greater in blood plasma as compared with the blood cells and a more toxic effect was produced with the Coolidge tube than with the gas tube.

The Effect on the Blood of Irradiation, Especially Short Wave Length Roentgen Ray Therapy. GEORGE R. MINOT, M. D., and ROY G. SPURLING, M. D., Am. J. Med. Sci. 168: 215-238, August, 1924.

THE literautre concerning the effect of irradiation on the formed elements of the blood is confusing. A review of the literature and an essentially complete bibliography are given.

This paper reports the study made of the blood of 42 cases, chiefly of cancer, before and after 56 roentgen irradiations had been given. Particular attention was given to the observations on 22 of the patients given 36 intensive short-wave-length treatments. The other treatments were milder. Cases of disease of the hemopoietic tissues are not included and the statements given below require modification when applied to such conditions.

The most important effect of the customary theraputic irradiation is to decrease the number of white cells, especially the lymphocytes. Preceding this decrease there is a slight increase due to the increment of the polymorphonuclear neutrophiles. Very small doses of irradiation may permit a lymphocytosis.

When a customary therapeutic dose of short-wave-length roentgen rays is given, it causes the white count to reach its lowest point about six days later and at that time the count may be below 5,000 per cubic millimeter (leukopenia). It is not unusual to find a decrease below normal of the absolute numbers of bone marrow white cells, which is indicative of marrow depression. This leukopenia lasts about nine days as a rule but it may last for over four weeks. If treatment is then given again before the number of cells have remained for some time at their original level, leukopenia of a greater degree and of a longer duration will result. The fall of the lymphocyte count is greatest in the first twenty-four hours but it continues to drop for about three days. These cells rise with the white count but they do so proportionately more slowly and subsequent treatments may keep the lympocytes fewer in proportion to the white count, than following the first irradiation.

The new short-wave length, roentgen ray therapy, suitably given, pro-

duces no changes in the blood that are of a different character from those occurring after milder yet intensive irradiation. However, it does produce more rapid, marked and persistent changes than milder treatment and if the treatment consists of merely moderate, long-wave exposures it may not even cause a decrease of white cells.

An eosinophilia of 7 and often as high as 23 per cent is usual two to three weeks after short wave length irradiation and appears to develop especially following repeated exposures.

After radiation, the blood for two or three days contains many degenerated white cells and larger doses produce a greater number of these cells than do the smaller ones. After short wave-length therapeutic irradiations the degenerated cells often are in the proportion of 25 to 100 formed white cells.

Some increase of immature white cells may be observed especially at about the time the white count begins to rise, after large doses. A slight increase of the platelets soon after irradiation is common. They are less readily depressed than the white cells but following the transient rise they are often found slightly decreased, rarely markedly. Combined with leukopenia they may be an indication of greater marrow depression than a decrease of only the bone marrow white cells. After four days of intensive irradiation and prior to a definite rise in the white count the platelets rapidly increase and remain elevated above normal for days to weeks.

Important changes in the count of the red blood corpuscles and hemoglobin percentage do not occur as a result of mild or intensive therapeutic irradiation. Changes in the number of immature cells occur.

The clinical condition of the patitnt will influence the degree and duration of the blood changes after irradiation, but anemia per se does not seem to be of any great importance. The white cells of patients whose clinical condition is similar, given the same dose in the same manner, show considerable variation. On the average, patients with higher white counts before irradiation will develop leukopenia and marked lymphopenia less often than those with lower counts.

Much more important than the clinical condition of the patient in determining the influence of irradiation on the blood is the size, intensity and character of the dose. Also the amount of surface area irradiated is a factor of great importance in determining the degree and duration of the decrease of white cells. The greater the area, the more profound is the effect. Secondary radiation, greater with larger than with smaller doses, with short wave than with long wave-length, and with a larger than a smaller portal of entry probably plays a role.

Depression of the activity of lymphatic tissue and bone marrow is an undesirable state but may be present for weeks without obvious detrimental effect.

The blood should be examined prior to irradiation. The white count alone will usually suffice to indicate the state of the hemopoietic organs. If this is 5,000 per cubic millimeter or more, then irradiation may be given without producing serious harm to the blood forming tissues. With leukopenia, especially if marked, repetition of treatment becomes more serious.

Before treatment is given a patient with leukopenia, a complete study of the formed blood elements should be made, for it may reveal a greater degree of marrow depression than that shown by leukopenia alone and so one may be induced to decide against irradiation. In such a case one must decide whether the benefits of treatment will offset the disadvantages of an increased depression of the hemopoietic tissue. This latter condition may be of relatively little importance and be less harmful than permitting a lesion to go untreated.

Roentgen Ray Studies of Stomach Function. JULIAN L. ROGATZ, M. D. Am. J. Dis. Children, 28:53-69, July 1924.

A GRUEL or cereal made with milk, no matter how thick it is before ingestion, becomes fluid in the stomach under the influence of saliva and body heat, whereas a food of mashed potato or vegetable mush retains its consistency.

The empty stomach is difficult to see with the fluoroscope. The filled stomach is clearly visible without contrast mediums and lies in the upper left quadrant of the abdomen, close to the diaphragm, extending in a horizontal plane to or just beyond the midline.

The stomach shadow on the plate may be defined by an upper, deeply shaded portion (the air bubble), and a lower, less intensely shaded area (the contents). The air bubble varies in size, shape and form in all stomachs with fluid content but is distinctly smaller or often absent when thick gruels are swallowed.

There are two main constant types of stomach with fluid feedings in the infant. Both are horizontal and extend to or just beyond the vertebral column to the right. Type No. 1 is that of a pear or flask lying on its side with a large circular, expanded fundus and a smaller, narrow pyloric area. Type No. 2 is less frequently seen and is smooth and either elliptical or oval in shape. These two types may assume a third form common to both when thick gruels are ingested, namely a small circular or oval form about one-third the size of the fluid forms with little or no bubble to be seen.

Roentgen Ray Studies of Stomach Function: The Peristolic Function. JULIAN L. ROGATZ, M. D., Am. J. Dis. Children, 28:69-75, July, 1924.

THERE is a divergence of opinion concerning a peristolic function of the stomach in infants, some authors affirming and others denying its existence. The peristaltic function is not to be confused with the more familiar peristaltic function and may be defined as that capacity of the stomach wall to surround or grasp its contents following the ingestion of food.

The purpose of this study was to prove the existence of the peristolic function in the stomachs of infants. Fluoroscopic examinations were made immediately before and after each meal and roentgenograms were made at the end of each feeding. Feedings were (a) an average milk formula of fluid consistency; (b) concentrated gruel of moderate thickness and (c) a very thick food of cereal and water or mashed potato and vegetables.

It was found that the infant stomach assumes either a pear or oval shape, horizontal in position and extending to or beyond the midline, the air bubble being large or moderate in size. With foods of very thick consistency the baby's gastric organ contracts down to a small circular or oval shape, barely reaching the midline, never extending beyond and with a very small air bubble or often none.

This peristolic reflex has a practical significance in the treatment of pylorospasm and habitual vomiting.

Roentgenological Studies of the Inner Surface of the Stomach and of the Movements of the Gastric Contents. CHR. I. BAASTRUP. Acta Radiologica, 3:180-203, June, 1924.

TWO new methods of rendering the inner surface of the stomach visible on the roentgenogram are described. The first is by covering the walls with dry bismuth powder while the cavity of the stomach is filled

with air. This method has not been fully worked out. The second method consists in covering the walls with a layer of barium meal, while the other parts of the cavity are filled with a sbustance that does not produce any shadow in the picture. This method seems to be of value for detection of pathological conditions in the stomach. The first method is used for physiological studies and it has been shown by this method that the prevailing views regarding the movements of food after its entrance into the stomach are erroneous in many respects.

Studies of the Colon. R. WALTER MILLS., and HORACE W. SOPER, M. D.. Am. J. Roentgenol. 11:487-508, June, 1924.

THESE studies were presented in two separate papers, the first, by Dr. Mills, being entitled "Roentgen Ray Evidence in Colonic Secondary Changes."

Dr. Mills said: "Much of value is not possible of statistical arrangement of proof by figures. Again, different causative factors may result in a common type of reaction only possible of utility through the interpretation of other evidence. * * often intangible evidence, not lending itself to verbal description or the approved type of formal presentation, must be largely lost or at least be far delayed in recognition. * * How can we visualize and verify for others the delicate variations in a roentgenogram of equally definite portent? Certainly not by any of the usual procedures of formal presentation of the chemical laboratory type. We are approximating art—the reactions of the sensibilities not possible of immediate transmission to others and to be acquired only through the language of the sensibilities cultured by experience.

"May I present then, the outline of an effort much of which I freely grant is not altogether capable of proof along usual lines, and possibly not untempered with imagination as to future possibilities, but which I hope may be of interest to others in their work? * * * My proposition is that the abdominal viscera, taking the colon as an example peculiarly fitted for such a purpose, may in their form and topography and especially through their contractural reactions give secondary evidence of many primary conditions not themselves otherwise possible of appreciation, and that certain anatomical and physiological variations seem, to say the least, associated with certain abnormalities of function."

Any acquired malstatic state, spinal curvature or pelvic axial deviation will influence colonic typography. A colon ptosis, per se, as a symptomful entity the author does not believe exists. The typography of the colon is influenced by less marked factors than extra-alimentary tumors. A narrow pelvis "determining a vertical rectum and pelvic colon may through resulting strain on the pelvirectal sphincter, be a primary factor in developing its acquired patulence with resulting disturbance. * * * There is evidence to suggest that great numbers of alimentary and extra-alimentary lesions, and products of lesions, stimulate certain secondary physiological colonic reactions giving roentgen ray evidence of their occurrence. * * * It is suggested that we may have indication of such conditions as the non-exudative colitides through secondary contractural modification of form."

"There is a vast deal to be learned as to colonic contractures as expressed by colonic rugae, perhaps mucosal movements as recently suggested by Forssell * * * It would seem possible that certain abnormalities in colonic function in turn result in secondary visual changes in form—witness the patulous rectosigmoid. * * * Certainly a possible predisposing pressure factor is present in practically all cases of colonic redundancy through the associated constipation * * * The whole vast subject of constipation * * * whose seriousness grows on us as we consider it, is open to and will richly reward roentgen ray investigation. * * *

"Most interestingly it is indicated that we may have light on the normal physiology of alimentary motility through its perversion in certain pathological conditions; that a carcinoma of the colon may be manifested by abnormalities in contractural and haustral outlines, far distant from it, both proximally and astonishingly far distal, perhaps expressing a disturbed motor gradient and thus visually indicating the presence of such. It is suggested that such typical contractures represent a disturbed motor gradient—balked efforts at normal contractures and haustration. * * * It is suggested, through resulting colonic outlines indicating slight and locally variable degrees of dilatation, that we may begin to understand how motility is interfered with in cases of organic lesions, which are non-obstructive through interference with their gradients; and that there is both a proximal and distal impairment. We may through similar means gain added light on the mechanism of causation of postoperative ileus, vomiting and gastric dilatation as occurring through distant traumatic interference with gradients, to motor inhibition.

"Perhaps and most helpful of all, the same agency may finally, and even now faintly, suggest factors concerned in the causation of what we call the reflex functional dyspepsias—our ignorance of which is our greatest humiliation.

THE RESTORATION OF COLONIC FUNCTION.

This is the title of Dr. Soper's contribution to this study. He discusses various types of abnormal colons, the hypertonic colon, the atonic colon and atonic conditions of the colon associated with spasm of the ilac colon and rectosigmoid. Also he discusses the redundant colon, contracted descending and iliac colon with atony of the pelvic colon and rectum, and contracted iliac and pelvic colon with extreme atony of the rectum and distal portion of the pelvic colon.

His summary reads thus: Restoration of function may be secured in practically all normal colons by the dietetic and hygienic method. It is important that concomitant low grade inflammatory conditions receive appropriate treatment, also that sphincter spasm be overcome by gradual dilatation of the anal canal. The best stimulants to colonic contracture may be named in the following order: The presence of formed fecal matter in the rectosigmoid region. (2) gradual intermittent dilatation of the anal canal. (3) The presence of food in the stomach. (4) The act of defecation. (5) The use of well considered daily abdominal muscle exercises.

A Method for the Roentgenological Visualization of the Gall-Bladder. EVARTS A. GRAHAM, M. D., Ann Clin. Med. 3:99, July, 1924.

THE author in collaboration with two other workers discovered that tetrabromphenolphthalein injected intravenously made the gall bladder show as plainly as bone and sometimes as clearly cut as the stomach after a barium meal. It takes about twenty-four hours for the effect to become complete. About 28 cases injected showed no bad symptoms except nausea and vomiting. There has been no change in urine or bile and no abnormality of the liver itself. A more extended report, written after this one, appears in the Journal of the American Medical Association for May 31, 1924, where the technique is fully described.

Treatment of Simple Papilloma of the Bladder by Fulguration. W. GIRLING BALL, British J. Surg. 11: 760-711, April, 1924.

THE author advocated transurethral cauterization to replace suprapubic removal of these papillomata. In experienced hands the application is easy and the patient need seldom remain in bed more than 48 hours, instead of weeks. Cystitis is less liable to complicate the case and the likelihood of recurrence is diminished. The operation can be performed under local anesthesia and if there are recurrences they can be kept in check provided they are small ones. The greatest disadvantage is the length of time required to complete the operation. For very large growths the author uses suprapubic incision with diathermic cauterization. Some growths of course are inaccessible but multiplicity of growths is not a contra-indication for fulguration. Cystitis is a contra-indication. The author describes his equipment and his technique.

Postoperative Roentgenotherapy of Breast Carcinoma. W. F. WASSINK, M. D., and C. PH. WASSINK VAN RAAMSDONK, M. D., Acta Radiologica, 3:114-127, June, 1924.

THE authors had the opportunity to compare the following groups of patients: (1) Patients operated in the clinic of Antoni van Leeuwenhoekhuis and prophylactically x-rayed. (2) Patients operated elsewhere but radiated by them. (3) Patients not treated with x-rays after operation who were sent to them with a recurrence after an operation in some other clinic.

The patients treated by x-rays after operation did not get recurrences in the subcutaneous tissue, neither in the axilla, ribs, sternum nor clavicle. The patients of Group 3 often showed that kind of a recurrence. The authors attribute this difference to the x-ray treatment. Conscientious research brought to light no evidence of harm done to any patient. In cases where a carcinomatous infiltration of the skin had occurred before operation x-ray treatment produced no lasting benefit. In general, the authors recommend x-ray treatment after radical breast amputation.

Massive Collapse of the Lung. GEORGE W. HOLMES, M. D. Am. J. Roentgenol. 11:509-516, June, 1924.

THE author says that he feels that he ought to make an apology for the title of this paper as there are a few good clinicians who doubt that there is such a thing as a massive collapse of the lung. However, he feels fairly satisfied that there is and he reports four cases seen in his clinic since 1922 when he reported others.

Massive collapse, he explained in answer to a question by Dr. Baetjer after the paper was read, means that the air is out of the lung and that it more or less collapses. It does not necessarily mean the whole side of the lung, it may be limited to one lobe.

"In all of the cases in this series there was marked displacement of the heart with the mediastinal contents, to the affected side; the diaphragm was high; and the roentgenoscopic observations showed no respiratory excursion. The shadow of the lung in the affected area was more dense than normal, and of a gray, mottled character, the density increasing toward the base. When the lower lobe was involved, the outline of the diaphragm was indistinct or absent. As the process clears up the density diminishes and the mottling in the affected areas becomes more distinct, so that in some stages it may resemble closely the mottling of tuberculosis. As the lung expands the heart returns to normal position but the diaphragm is apt to remain somewhat elevated and limited in respiratory excursion. Not infrequently pneumonia develops in the affected lobe, and will be shown on the plate as a sharply circumscribed area of increased density. At this time the heart may have assumed the normal position.

"The roentgen findings in massive collapse simulate very closely those seen in collapse of the lung from other causes, such as foreign body in the bronchus, syphilis and primary malignant disease; and from the plates alone it may be impossible to make a definite diagnosis. The history should make the diagnosis clear in most cases, but if there is still doubt, repeated plates should be taken.

"Extreme displacement of the heart, the most characteristic finding, is sometimes seen in diseases of the lungs of infectious origin, especially those chronic lesions accompanied by extensive fibroid changes. But in these conditions, the shadow cast by the affected lung is more irregular, and may even show evidence of cavity formation. The correct interpretation can usually be made from these findings.

The Value of the X-Ray in the Diagnosis of Pulmonary Tuberculosis and Allied Conditions. FRANK HOWARD FOLKINS, M. D., J. Am. Inst. Homeopathy, 17:429-433, May, 1924.

THE x-rays are of value in the diagnosis and treatment of many chest conditions. It may be of value in picking out latent lesions of tuberculosis, in watching the progress of a case, in assisting in differential diagnosis, establishing the topography of the lesion, confirming clinical diagnosis, diagnosing cavities and assisting in the treatment by artificial pneumothorax. The author does not believe that the latter treatment should ever be attempted without checking up by x-ray.

No definite standard for normal lung shadows can be given. The appearance of the lung shadows in the different stages of tuberculosis is discussed, also the typical appearances found in the following: Chronic bronchitis, lobar pneumonia, bronchial pneumonia, pneumonoconiosis, bronchiectasis, miliary tuberculosis, syphilis, lung abscess gangrene, echinococcus, primary malignancy, metastastic malignancy.

Some Experiences of Bronchography After Injections of Lipiodol. E. DANIELSSON, and J. MANFRED, Acta Radiologica 3:158-159, June, 1924.

AFTER injection of lipiodol into the trachea the authors have studied the bronchial tree in the roentgenogram, the lower as well as the middle and upper main bronchi. The communications between the cavities and the bronchi can be seen in this way right out to the attachment of the lateral adhesions. The therapeutic effect of this harmless, local iodine treatment of the bronchial tree may be discussed in a later paper.

Textbook and Atlas of Roentgen Diagnosis. By FRANK M. GROEDEL, M. D. Frankfort, Germany. Octavo. Cloth. Published 1924 by J. F. Lehmann, 26 Paul Heyse Str., Munich, Germany. Price $13.00.

THIS work is complete in two volumes and an atlas, and the set will not be broken; the price quoted is for all three. It is a comprehensive work in which the author was aided by Drs. Brauer, Dietlen, Goetze, Haenisch, Holzknecht, Jamin, Immelmann, Koehler, Krause, Loos, Lossen, Otten, Pfeiffer, Schnaudigel and Spiess. The atlas is paper bound and fits into a pocket on the inside of the cover of the second volume and this separate arrangement of atlas and text is not as awkward as one would think at first in a book of this size. The text consists of 1,110 pages, 100 of which are explanatory of the 712 films pictured in the at-

las. Besides the plates in the atlas the text is illustrated by over 700 figures, diagrams, etc. An extensive bibliography (German) follows each chapter.

The chapters are upon (1) physics of the roentgen rays; (2) technique; (3) place of the roentgen rays in internal medicine; (4) roentgen rays and the body; (5) roentgen rays in diseases of the brain, spinal cord, peripheral nerves, eye, ear, jaws and teeth; (5) upper air passages; (7) normal thorax; (8) diaphragm and respiration; (9) trachea and upper mediastinum; (10) the roentgen rays in combination with tracheobronchoscopy and esophagoscopy; (11) picture of the pathological lung; (12) tumors of the thorax; (13) roentgen diagnosis of bronchial disease; (14) roentgen diagnosis of certain lung diseases exclusive of tuberculosis; (15) pulmonary tuberculosis; (16) diagnosis of diseases of the pleurae; (17) diagnosis of diseases of the pericardium; (18) roentgen study of the heart; (19) roentgen study of the blood vessels; (20) roentgen diagnosis of diseases of the digestive tract; (21) diagnosis of diseases of the esophagus and of the stomach; (22) roentgen study of the bowels; (23) roentgen observations of changes in the digestive tract following upon certain operations; (24) liver and gall bladder; (25) spleen; (26) roentgen diagnosis of diseases of the pancreas; (27) diagnosis of diseases of the genito-urinary tract; (28) differential diagnosis of abdominal diseases by means of pneumoperitoneum; (29) bone diseases; (30) roentgen examination in diseases of children. Films of cases illustrating each of the above indicated lesions are given in the atlas in great abundance.

Lectures on Electro-Physiotherapy. Octavo. Cloth. Pp. 354. Published by H. G. Fischer & Co., 2333 Wabansia Ave., Chicago.

THIS book presents the lectures delivered in Chicago, October 15th to 19th at the Logan Square Masonic Auditorium under the auspices of the H. G. Fischer Company. The book has much in it of interest and value to the physiotherapist. It has not, however, been edited in accordance with its deserts, and this detracts from its appearance.

Lecturers were Drs. T. Howard Plank, Gustav Kolischer, Wm. E. Howell, A. L. Yocom, Jr., Frederick H. Morse, Curran Pope, Roswell T. Pettit, H. I. Smith, Ward T. Burdick, R. W. Fouts, Frank M. Barns, and Emile Du Val. The subjects of the lecturers were as follows:

Physics in Medical Diathermy; Electrocoagulation; Principles of Medical and Surgical Diathermy; Diathermy in Industrial Practice; Where Galvanism May be Used in Place of Surgery; High Potential Deep Therapy Treatment of Carcinoma as Practiced in Germany; Electrocoagulation and High Frequency in General Practice; Alternating Currents in Electrotherapy; Diagnosis and Bacteriology of Colon Diseases; Medical Diathermy in Its Special Applications; Practical Application of Actinic Rays in General Practice; Radiology and Physiotherapy as Practiced in a Small Town; Physics of Light Therapy; Preparatory Examination for Physiotherapy Treatments; Electrothermic Coagulation; General Employment of Electrocoagulation Including Tonsils and Hemorrhoids; Surgical Diathermy in Tumors of the Head and Breast; Industrial Physiotherapy; Physiotherapeutic Treatment of Colon Diseases; Electricity in Non-Suppurative Affections of the Uterine Appendages; Heliotherapy in the Treatment of Tuberculosis; Value of a Combination of Physiotherapeutic Modalities; X-Rays and Their Biologic Effect; Surgical Diathermy in Tumors of the Vagina and Uterus; Clinic and Demonstratons at the American Hospital (Electrocoagulation); Treatment of Sacro-Iliac Dislocations with High Frequency Currents; Physiotherapy in Arthritic Conditions; Surgical Diathermy in Tumors of the Bladder and Prostate; Physiotherapy in Bone and Joint Injuries; Electrotherapeutics in Orthopedics; Recording and Filing Case Histories and Treatments.

Apparatus for Radiology. NEWTON & WRIGHT, Ltd., 471-473 Hornsey Road, London, N 19.

THIS is an illustrated price list put out by this company in 1924.

Operation vs. Radiotherapy in Uterine Cancer. KARL NEUWIRTH, M. D. Octavo. Paper, 36 pp. Published by Wilhelm Braummueller, Wien, IX, 1, Germany.

THIS little pamphlet refutes the arguments against radiotherapy of uterine cancer. Opinions of many prominent workers are quoted. The author believes that surgery has a place in treatment but not in every case.

Roentgen Treatment of Internal Diseases. FRITZ SALZMANN, M. D. Octavo, 55 illus., 380 pp. Published by J. F. Lehmann, 26 Paul Heyse Str. Munich, Germany. Price, $2.00 unbound, $2.35 bound.

THIS book is a compiliation of various authors, five of the twenty chapters being by Salzmann. The chapters are: (1) Physics of roentgenotherapy, Cermak; (2) biological foundation of roentgenotherapy, Rost and Keller; (3) roentgenotherapy in tuberculosis of the lungs, Bachmeister; (4) roentgenotherapy of glandular tuberculosis, Stepp; (5) roentgen treatment of tuberculosis of the peritoneum, Stepp; (6) roentgen treatment of tuberculosis of the breast, Holfelder; (7) roentgen treatment of bronchial asthma, Groedel & Lossen; (9) roentgen rays in diseases of the heart and blood vessels, Groedel & Lossen; (10) roentgen treatment of Basedow's disease, Salzmann; (11) roentgen rays in tumors of the hypophysis, Salzmann; (12) roentgen rays in diseases of the thymus, Salzmann; (13) roentgen rays in diseases of the pancreas, Salzmann; (14) roentgen rays in disturbances of the ovaries, Langer; (15) roentgenotherapy of malignant tumors, Mueller; (16) the roentgen rays in diseases of the nervous system, Strausz; (17) measurement and dosage, Voltz; choice of field for radiation, Holfelder; (18) roentgen treatment of diseasese of the blood, Herzog & Morawitz; (19) roentgen ray injuries, Salzman; (20) liability of the roentgenologist, Pfeiffer.

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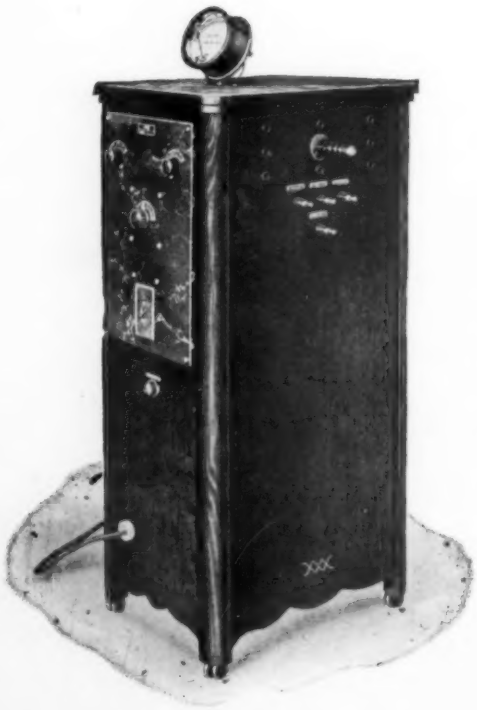

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